REMINGTON
FULL KEYBOARD and 10 KEY ADDING MACHINES
SEARCY MODELS 1-4 & 5

INSTRUCTION MANUAL

Remington OFFICE MACHINES
DIVISION OF SPERRY RAND CORPORATION
SPERRY RAND BLDG. - NEW YORK, N.Y. 10019

DM-227

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FOREWORD

THIS INSTRUCTION MANUAL IS INTENDED PRIMARILY FOR MECHANICS; HOWEVER, IT CAN BE STUDIED TO A VERY GOOD ADVANTAGE BY SALESMEN.

THIS MANUAL IS NOT AN OPERATOR'S INSTRUCTION MANUAL AND SHOULD NOT BE GIVEN TO CUSTOMERS.

THE DRAWINGS CONTAINED IN THIS MANUAL SHOULD BE STUDIED IN CONNECTION WITH THE WRITTEN INSTRUCTIONS AND ARE OF GREAT ASSISTANCE IN LEARNING THE FUNCTIONS AND ADJUSTMENTS OF THE VARIOUS MECHANICAL UNITS.

FOR THOSE IN THE FOREIGN FIELD WHO DO NOT READ ENGLISH, A CAREFUL STUDY OF THE DRAWINGS WILL GIVE HELPFUL FUNDAMENTAL INFORMATION.

STUDY ONE UNIT THOROUGHLY BEFORE GOING ON TO ANOTHER.

TO OBTAIN THE BEST RESULTS, LEARN THE ADJUSTMENTS WHICH PERTAIN TO ONE UNIT FROM THE MANUAL, THEN MAKE THEM ON THE MACHINE.

PAGES 10 THROUGH 32 COVER INSTRUCTIONS FOR REMOVING, REASSEMBLING AND ADJUSTING OF MACHINE CASE AND BOTTOM COVER, KEYBOARD AND CLUTCH ACTUATING MECHANISM AND ALSO EXPLAINS MOTOR DRIVE, MOTOR AND GOVERNOR MECHANISM.

MODELS 1-4-5

INSTRUCTION MANUAL

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KEY TO MACHINE MODEL NUMBERS

THE MODEL NUMBER WILL ALWAYS BE EXPRESSED BY A SEVEN-DIGIT NUMBER. THE FOLLOWING, WHICH IS SELF-EXPLANATORY, SHOWS HOW THE MODEL NUMBER IS DERIVED:

BASIC MACHINE (1 DIGIT)	LISTING CAPACITY (2 DIGITS)	TOTALING CAPACITY (1 DIGIT)	BASIC FEATURES (1 DIGIT)	CARRIAGE (1 DIGIT)	SPECIAL FEATURES (1 DIGIT)
1-FULL KEYBOARD HAND OPERATED	08 COLUMN	1-ONE MORE THAN LISTING	1-DIRECT SUBTRACT	1 - 3"	0 - NONE
4-TEN KEY ELECTRIC	08 COLUMN	0-SAME AS LISTING	1-DIRECT SUBTRACT		0 - NONE
5-FULL KEYBOARD ELECTRIC	10 COLUMN	1-ONE MORE THAN LISTING	2-CREDIT BALANCE		0 - NONE
5-FULL KEYBOARD	10 COLUMN	1	1	1	1 2 3-1/60 FRAC. 4-1/8 FRAC. 5-1/12 FRAC. 6 7 8 9*

*THESE NUMBERS ARE RESERVED FOR SPECIAL FEATURES OTHER THAN THOSE LISTED.

THE FOLLOWING IS A BREAKDOWN OF A FEW MODEL NUMBERS:

1. 10811-10 - THE FIRST (1) INDICATES HAND OPERATED. (08) INDICATES EIGHT COLUMN LISTING CAPACITY. SECOND (1) INDICATES ADDITIONAL COLUMN FOR TOTALING. THIRD (1) INDICATES DIRECT SUBTRACT. FOURTH (1) INDICATES 3" CARRIAGE. (0) INDICATES NO SPECIAL FEATURES.

2. 40801-10 - THE (4) INDICATES TEN-KEY ELECTRIC. (08) INDICATES LISTING CAPACITY. (0) INDICATES NO ADDITIONAL COLUMN FOR TOTALING. FIRST (1) INDICATES DIRECT SUBTRACT. SECOND (1) INDICATES 3" CARRIAGE. (0) INDICATES NO SPECIAL FEATURES.

3. 51012-10 - THE (5) INDICATES FULL KEYBOARD ELECTRIC. (10) INDICATES LISTING CAPACITY. FIRST (1) INDICATES ONE EXTRA COLUMN FOR TOTALING. (2) INDICATES CREDIT BALANCE. SECOND (1) INDICATES 3" CARRIAGE. (0) INDICATES NO SPECIAL FEATURES.

4. 51011-13 - THE (5) INDICATES FULL KEYBOARD ELECTRIC. (10) INDICATES LISTING CAPACITY. FIRST (1) INDICATES ONE EXTRA COLUMN FOR TOTALING. SECOND (1) INDICATES DIRECT SUBTRACT. THIRD (1) INDICATES 3" CARRIAGE. (3) INDICATES SPECIAL FEATURE (1/60 FRACTION).

SALES MANUALS MAY BE CONSULTED AS TO SPECIAL FEATURES OTHER THAN THOSE LISTED.

OPERATING INSTRUCTION BOOKLETS SHOULD BE STUDIED IN ORDER TO LEARN HOW TO OPERATE MACHINE CORRECTLY AND TO THE BEST ADVANTAGE.

REFERENCE TO FRONT OF MACHINE MEANS THE END ON WHICH KEYBOARD IS LOCATED AND RIGHT SIDE OF MACHINE AS VIEWED FROM FRONT WOULD BE THE SIDE REPEAT KEY OR HANDLE IS LOCATED. THE REAR OF MACHINE MEANS END CARRIAGE (PRINTER) IS ON AND LEFT SIDE OF MACHINE WOULD BE THE SIDE NON-ADD KEY IS ON.

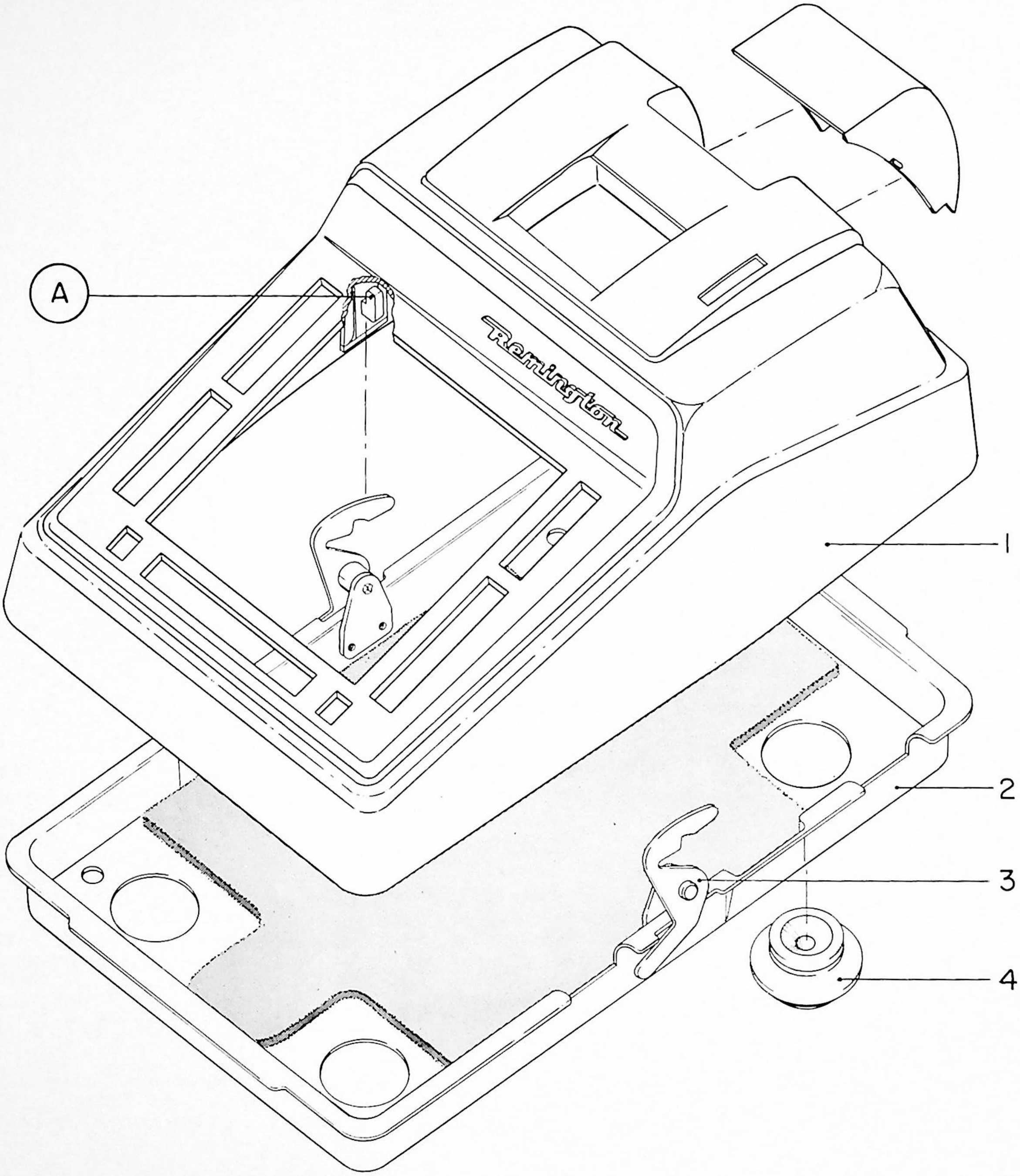


PLATE I MACHINE CASE and BOTTOM COVER

MACHINE CASE AND BOTTOM COVER

REMOVAL

REMOVE MOTOR CORD PLUG FROM OUTLET.

UNHOOK MACHINE CASE LEVERS (3) (PLATE 1) FROM EARS (A) ON INSIDE OF CASE (1) BY MOVING LEVERS DOWN.

REMOVE BOTTOM COVER (2) BY PUSHING FOUR RUBBER FEET (4) OUT OF BOTTOM COVER (2) AND REMOVING MOTOR CORD GROMMET FROM SLOT IN BOTTOM COVER (2).

RE-ASSEMBLY

TURN MACHINE UPSIDE DOWN. SET BOTTOM COVER (2) ON MACHINE WITH SLOT FOR MOTOR CORD GROMMET TO REAR. INSERT GROMMET IN SLOT, PUSH DOWN ON BOTTOM COVER (2) (SLIGHT PRESSURE) AND CAREFULLY WORK RUBBER FEET (4) THROUGH HOLES.

PLACE MACHINE CASE (1) ON MACHINE. (MAKE SURE CASE SEATS PROPERLY ON FOUR UPPER COVER GROMMET BRACKETS (5) (FIGURE 1). PULL MACHINE CASE LEVERS (3) (PLATE 1) UP TO LATCH OVER EARS (A) ON INSIDE MACHINE CASE (1).

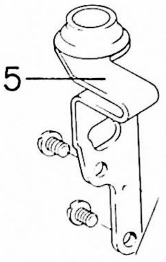


FIG. 1

INSPECTIONS AND ADJUSTMENTS

1. MACHINE CASE (1) SHOULD BE CENTERED ON KEYBOARD AND PRINTER OPENINGS.

   ADJ. FORM FRONT AND REAR UPPER COVER GROMMET BRACKETS (5) AND (6) (FIGURE 2) HORIZONTALLY.

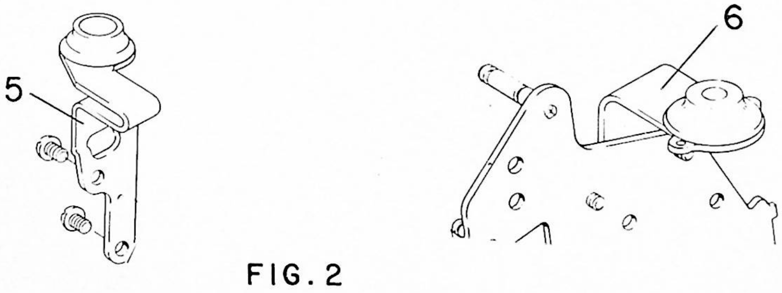


FIG. 2

2. MACHINE CASE (1) (PLATE 1) SHOULD CLEAR PLATEN BY APPROXIMATELY .090".

   ADJ. FORM REAR UPPER COVER GROMMET BRACKETS (6) (FIGURE 2) VERTICALLY.

3. FRONT EDGE OF CASE CUT-OUT FOR KEYBOARD SHOULD BE APPROXIMATELY PARALLEL TO NO. 1 KEYTOP APRONS (7) (FIGURE 3).

ADJ. FORM FRONT UPPER COVER GROMMET BRACKETS (5) VERTICALLY.

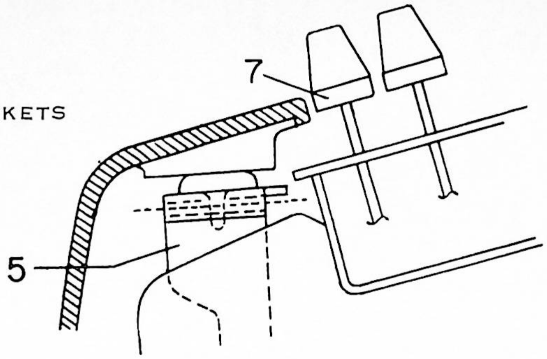


FIG. 3

4. MACHINE CASE LEVERS (3) (FIGURE 4) SHOULD OPERATE EASILY BUT FIRMLY AND HOLD MACHINE CASE SECURELY.

ADJ. FORM CASE LEVERS (3) UP OR DOWN.

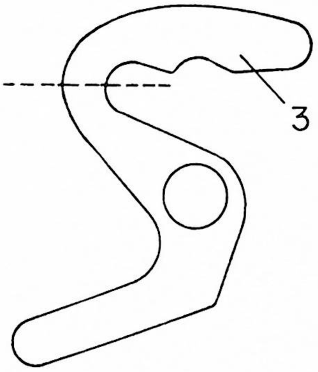


FIG. 4

5. MACHINE CASE (1) (PLATE 1) SHOULD BE POSITIONED ON MACHINE TO CLEAR ALL AMOUNT KEYTOPS AND CONTROL KEYTOPS.

ADJ. RE-CHECK ADJUSTMENTS 1 THRU 4.

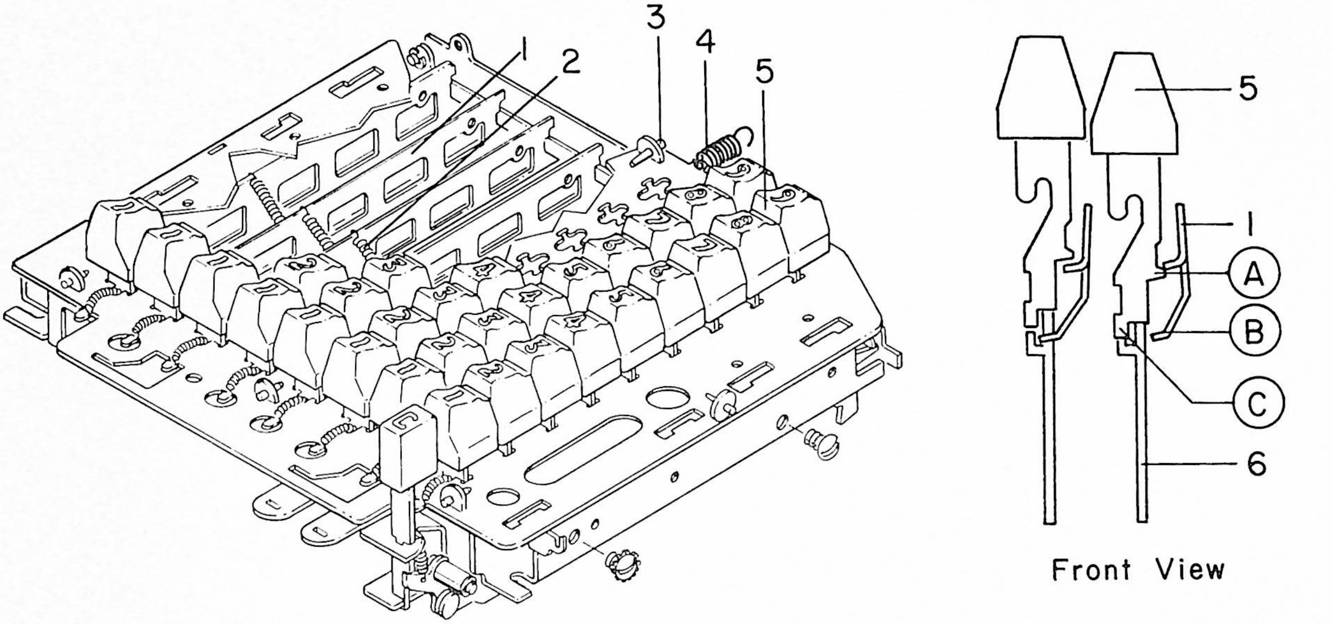
controll keys (symble left)

amount

KEYBOARD

THE PURPOSE OF KEYBOARD IS TO RECEIVE AN AMOUNT OR ENTRY AND TO DIRECT THE USE OF THIS ENTRY. THE AMOUNT OF ENTRY, THROUGH THE USE OF CONTROL KEYS, MAY BE ACCEPTED FOR INDIVIDUAL OR REPEATED ADDITION OR SUBTRACTION OR MAY BE NON-ADDED. TOTAL AND SUB-TOTAL KEYS DIRECT MACHINE TO PRINT ACCUMULATED AMOUNTS.

THE FULL KEYBOARD MACHINE CONTAINS NINE ROWS OF AMOUNT KEYS FOR EACH LISTING COLUMN. AMOUNT KEYS ARE OF TWO COLORS TO DIVIDE KEYBOARD INTO ROWS FOR QUICK IDENTIFICATION OF COLUMNS. FOR EXAMPLE: TWO ROWS ARE LIGHT GREEN FOR UNIT AND TENS COLUMNS, THREE ROWS ARE OFF-WHITE KEYS FOR $1, $10 AND $100 COLUMNS, ETC.



Front View

PLATE 2

MACHINE NORMAL, NO AMOUNT KEYS (5) (PLATE 2) DEPRESSED, ZERO STOP AND LOCK BARS (1) WILL BE HELD TO LEFT BY SPRINGS (2). THIS WILL POSITION ZERO STOPS (B) (INSET) IN FRONT OF MAIN RACKS (6) WHICH WILL PREVENT ANY SUBSTANTIAL FORWARD MOVEMENT OF MAIN RACKS (6).

WHEN AN AMOUNT KEY (5) (SEE INSET) IS DEPRESSED, CAM LOBE (A) CAMS ZERO STOP AND LOCK BAR (1) TO RIGHT WHICH WILL RELEASE ANY KEY (5) IN THE SAME COLUMN WHICH WAS PREVIOUSLY LATCHED DOWN. WHEN AMOUNT KEY (5) IS FULLY DEPRESSED, ZERO STOP AND LOCK BAR (1) PARTIALLY RESTORES OVER CAM LOBE (A), LATCHING AMOUNT KEY DOWN. ZERO STOP (B) ON ZERO STOP AND LOCK BAR (1) WILL NOW BE HELD TO RIGHT, OUT OF THE PATH OF MAIN RACK (6). THIS WILL ALLOW MAIN RACK (6) TO MOVE TO FRONT OF MACHINE AND LIMIT ON LOWER EXTENSION (C) OF AMOUNT KEYSTEM.

ON ALL MACHINES THAT TOTAL ONE MORE THAN THEY LIST, THERE IS ONE ADDITIONAL ZERO STOP AND LOCK BAR (1) TO CONTROL LAST ORDER MAIN RACK (6).

AUTOMATIC KEY RELEASE MECHANISM

AMOUNT KEYS (5) (PLATE 3) ARE AUTOMATICALLY RELEASED FROM LATCHED POSITION ON ADD, SUBTRACT OR NON-ADD OPERATIONS IN THE FOLLOWING MANNER:

ON FIRST HALF OF MAIN CONTROL SHAFT CYCLE, AUTOMATIC KEY RELEASE LINK (9) WILL MOVE FORWARD THRU SPRING (10) POSITIONING STUD (D) ON LINK TO FRONT OF KEY RELEASE LEVER (6). NEAR END OF CYCLE, AUTOMATIC KEY RELEASE CAM (8) WILL ACTUATE AUTOMATIC KEY RELEASE LINK REARWARD, CAUSING STUD (D) TO CONTACT AND ROTATE KEY RELEASE LEVER (6) COUNTER-CLOCKWISE. THIS, IN TURN, THRU EXTENSION (B), MOVES KEY RELEASE BAR (4) TO RIGHT, CONTACTING REAR EXTENSION (A) ON ZERO STOP AND LOCK BARS (1), RELEASING ALL DEPRESSED AMOUNT KEYS (5), PERMITTING THEM TO RESTORE THRU TENSION OF SPRINGS (3). DUE TO THE CONTOUR OF AUTOMATIC KEY RELEASE CAM (8), AUTOMATIC KEY RELEASE LINK (9) WILL PARTIALLY RESTORE TO THE FRONT, ALLOWING KEY RELEASE LEVER (6) AND KEY RELEASE BAR (4) TO PARTIALLY RESTORE, PERMITTING ZERO STOP AND LOCK BARS (1) TO MOVE TO THE LEFT UNDER INFLUENCE OF SPRINGS (2), POSITIONING ZERO STOPS IN PATH OF MAIN RACKS.

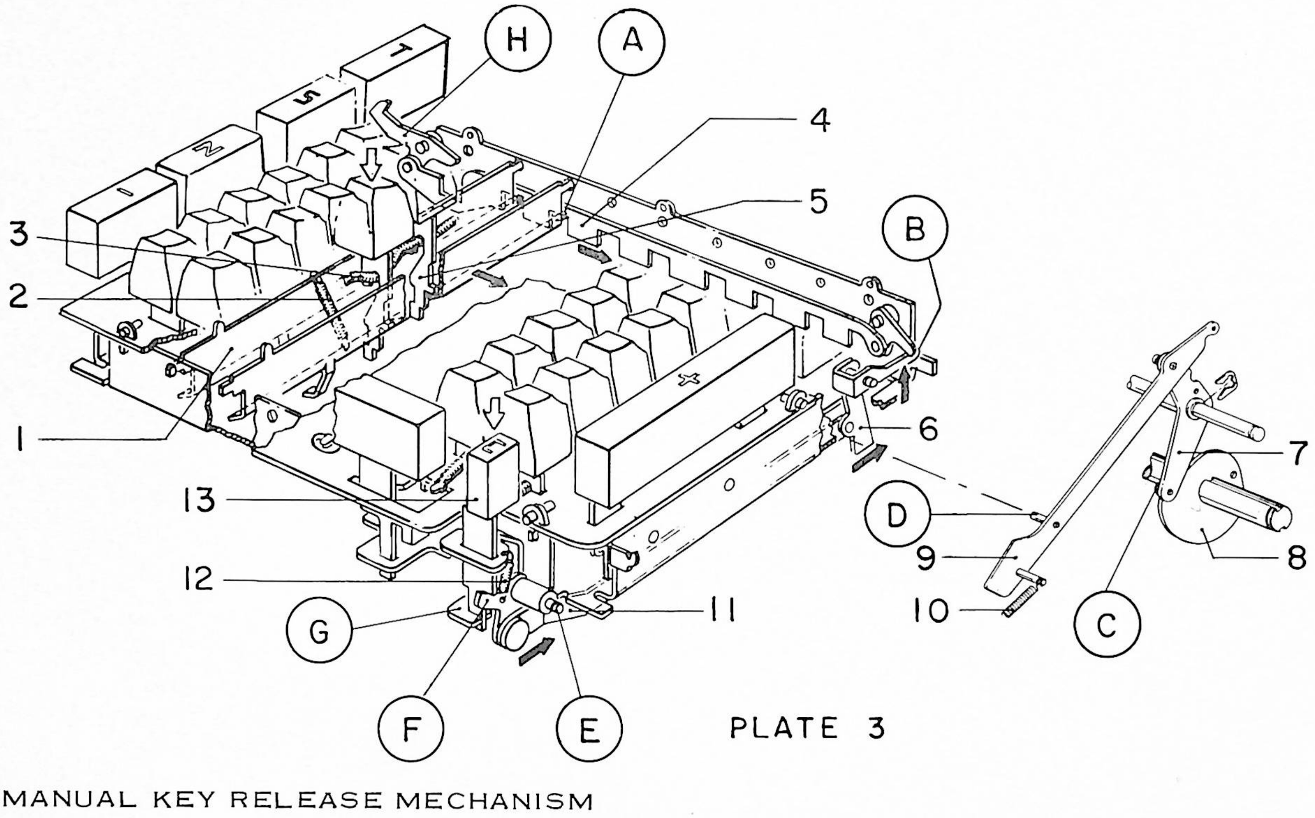


PLATE 3

MANUAL KEY RELEASE MECHANISM

AMOUNT KEYS (5) (PLATE 3) ARE MANUALLY RELEASED FROM LATCHED POSITION BY DEPRESSING CORRECTION KEY (13).

DEPRESSING CORRECTION KEY (13) MOVES CORRECTION KEY LINK (11) TO REAR WHICH ROTATES KEY RELEASE LEVER (6) COUNTER-CLOCKWISE AND, THRU EXTENSION (B), MOVES KEY RELEASE BAR (4) TO RIGHT. KEY RELEASE BAR (4) WILL CONTACT REAR EXTENSIONS (A) ON ZERO STOP AND LOCK BARS, MOVING THEM TO RIGHT, UNLATCHING ANY DEPRESSED AMOUNT KEYS (5), ALLOWING THEM TO RESTORE THRU TENSION OF SPRINGS (3).

WHEN CORRECTION KEY (13) IS RELEASED, ALL PARTS RETURN TO NORMAL THRU SPRING (12). ZERO STOP AND LOCK BARS (1) WILL RESTORE THRU SPRINGS (2) POSITIONING ZERO STOPS IN FRONT OF MAIN RACKS.

REMOVAL

REMOVE MACHINE CASE (1) (PLATE 1).

UNHOOK TWO SPRINGS (4) (PLATE 4) FROM REAR END OF UPPER KEYBOARD PLATE (5).

UNHOOK SPRINGS (3) AND (4) (PLATE 5) FROM EXTENSION (A) IN RIGHT FRONT CORNER OF KEYBOARD FOR ADD CLUTCH PARALLEL SHAFT (7) AND ADD KEY ACTUATED BELLCRANK (5).

REMOVE KEEPER FROM RIGHT END OF ADD CLUTCH CONTROL PARALLEL SHAFT (7) ON INSIDE RIGHT SIDE FRAME. PULL SHAFT TO RIGHT FAR ENOUGH TO DISENGAGE ADDITION CONTROL PARALLEL ARMS (2) FROM FRONT ADD KEY. REMOVE FRONT ADD KEY.

REMOVE FOUR KEYBOARD MOUNTING SCREWS (11) (PLATE 4). (TWO ON RIGHT AND TWO ON LEFT) NOTE: TWO FRONT SCREWS HAVE LOCKWASHERS.

KEYBOARD MAY NOW BE REMOVED BY RAISING RIGHT SIDE SLIGHTLY TO DISENGAGE EXTENSION (H) OF KEY RELEASE BAR (4) (PLATE 3) FROM UNDER POWER KEY RELEASE ARM.

DISMANTLE KEYBOARD

REMOVE LEFT TOTAL AND SUB-TOTAL KEY RETAINER (20) (PLATE 4) BY REMOVING TWO SCREWS. REMOVE KEYSTEMS (18) AND (19).

REMOVE NON-ADD AND SUBTRACT KEY RETAINER (20) BY REMOVING TWO SCREWS. REMOVE KEYSTEMS (16) AND (17).

REMOVE RIGHT TOTAL AND REPEAT KEY RETAINER (6) BY REMOVING TWO SCREWS. REMOVE KEYSTEMS (8) AND (9).

UNHOOK SPRING (12) (PLATE 3) FOR CORRECTION KEY LINK (11) FROM EXTENSION IN RIGHT FRONT CORNER OF KEYBOARD.

REMOVE KEEPER FOR CORRECTION KEY LINK (11) FROM STUD IN RIGHT FRONT CORNER OF KEYBOARD. DISENGAGE FORK AT REAR OF LINK (11) FROM KEY RELEASE LEVER (6) AND REMOVE LINK (11).

REMOVE CORRECTION KEY (13).

POSITION KEYBOARD UPSIDE DOWN AND REMOVE EIGHT AMOUNT KEY RETAINERS (14) (PLATE 4) BY REMOVING SCREWS.

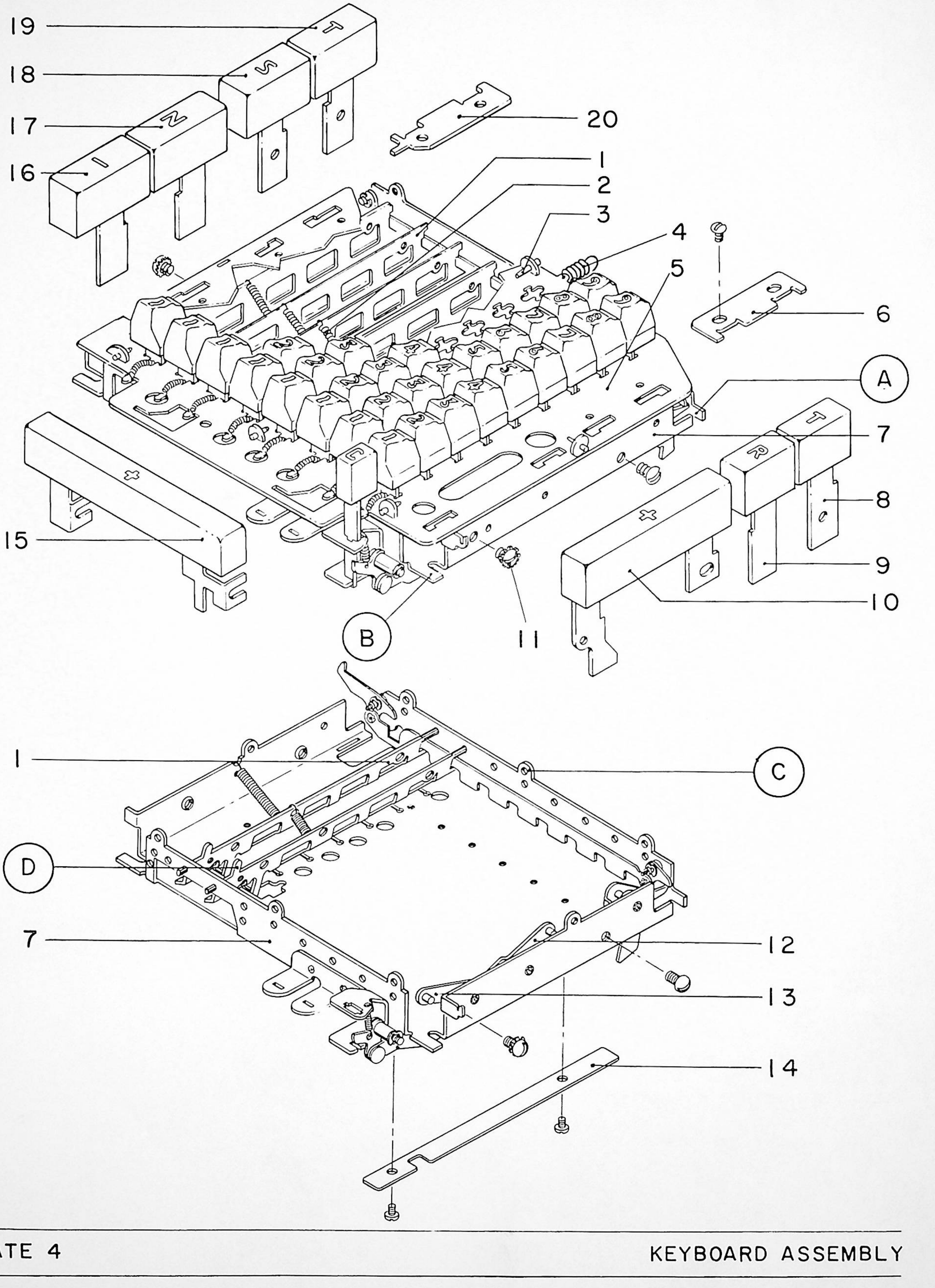
POSITION KEYBOARD IN UPRIGHT POSITION. ACTUATE KEY RELEASE BAR (4) (PLATE 3) AND REMOVE ONE ROW OF AMOUNT KEYS (5) AT A TIME.

REMOVE REAR ADD KEY BELLCRANK (12) (PLATE 4) BY REMOVING KEEPER. REMOVE FRONT ADD KEY BELLCRANK (13) AND THEN REMOVE RIGHT ADD KEY (10).

REMOVE EIGHT KEYBOARD TOP PLATE PINS (3).

REMOVE KEYBOARD TOP PLATE (5).

UNHOOK EIGHT ZERO STOP AND LOCK BAR SPRINGS (2).


A
B
C
D
T
S
N
I
+
C
R
T
+

REMOVE ZERO STOP AND LOCK BARS (1) STARTING FROM LEFT SIDE. ARRANGE BARS IN SAME ORDER AS THEY WERE ASSEMBLED IN MACHINE. TO REMOVE BARS, LINE UP ZERO STOPS WITH CUT-OUT IN LOWER KEYBOARD PLATE (7) . THEN PUSH BARS TO REAR TO DISENGAGE FRONT END FROM LOWER PLATE (7) . RAISE FRONT END OF BARS AND MOVE FORWARD TO DISENGAGE REAR END FROM LOWER PLATE (7) . TO REMOVE LAST ZERO STOP AND LOCK BAR (1) , IT WILL BE NECESSARY TO SLIGHTLY SPRING LOWER PLATE.

REMOVE KEY RELEASE BAR (4) (PLATE 3) BY REMOVING KEEPERS.

REMOVE KEY RELEASE LEVER (6) BY REMOVING KEEPER.

REASSEMBLY OF KEYBOARD

REPLACE KEY RELEASE LEVER (6) WITH KEEPER.

REPLACE KEY RELEASE BAR (4) WITH KEEPERS.

REPLACE ZERO STOP AND LOCK BARS (1) WITH SPRINGS (2) EXTENDING TO THE LEFT. REHOOK SPRINGS (2) .

REPLACE KEYBOARD TOP PLATE (5) (PLATE 4) , PLACING IT OVER EXTENSIONS (C) ON LOWER PLATE (7) AND PLACING EXTENSIONS (D) OF ZERO STOP AND LOCK BARS (1) IN SLOTS IN TOP PLATE (5) . REPLACE EIGHT PINS (3) . CHECK ZERO STOP AND LOCK BARS (1) FOR STRAIGHT AND FREE. FORM ZERO STOP AND LOCK BARS (1) .

REPLACE RIGHT ADD KEY (10) WITH LONGEST EXTENSION TO THE FRONT.

REPLACE FRONT ADD KEY BELLCRANK (13) WITH HUB AND STUD TO RIGHT. PLACE STUD IN HOLE IN ADD KEY (10) .

REPLACE REAR ADD KEY BELLCRANK (12) WITH HUB TO RIGHT AND ELONGATED SLOT TOWARD FRONT. PLACE SLOT OVER REAR STUD IN FRONT BELLCRANK (13) AND REAR STUD IN HOLE IN ADD KEY (10) . REPLACE KEEPER ON PIVOT STUD FOR REAR BELLCRANK (12) .

REPLACE AMOUNT KEYS WITH FIRST AND SECOND ROWS (GREEN), STARTING FROM RIGHT; THIRD, FOURTH AND FIFTH ROWS (WHITE) ; SIXTH AND SEVENTH ROWS (GREEN) . (REPLACE ONE ROW OF AMOUNT KEYS (5) AND AMOUNT KEY RETAINERS (14) AT A TIME.)

CHECK EACH ROW OF AMOUNT KEYS FOR FREE WITH NO EXCESS SIDE PLAY. REPOSITION RETAINING PLATES (14) .

REPLACE CORRECTION KEYSTEM (13) (PLATE 3) .

REPLACE CORRECTION KEY LINK (11) BY FIRST PLACING FORK ON STUD IN KEY RELEASE LEVER (6) AND THEN ON STUD (E) IN RIGHT FRONT CORNER OF KEYBOARD WITH EXTENSION (F) UNDER CORRECTION KEYSTEM (13) . REPLACE KEEPER ON INNER SLOT OF STUD (E) AND REHOOK SPRING (12) .

REPLACE RIGHT TOTAL AND REPEAT KEYS (8) AND (9) (PLATE 4) WITH RETAINER (6) . CHECK KEYS FOR FREE WITH NO EXCESS SIDE PLAY. REPOSITION RETAINERS (6) .

STARTING FROM FRONT OF KEYBOARD, REPLACE SUBTRACT (16) , NON-ADD (17) , SUB-TOTAL (18) AND LEFT TOTAL KEY (19) WITH RETAINERS (20) . CHECK KEYS FOR FREE WITH NO EXCESS SIDE PLAY. REPOSITION RETAINERS (20) .

REPLACE KEYBOARD

POSITION KEY RELEASE BAR EXTENSION (H) (PLATE 3) UNDER POWER KEY RELEASE ARM. LOWER KEYBOARD SO EXTENSIONS (A) AND (B) (PLATE 4) ON LOWER PLATE (7) ARE LIMITING ON SIDE FRAMES. REPLACE FOUR SCREWS (11). (TWO FRONT SCREWS HAVE LOCKWASHERS)

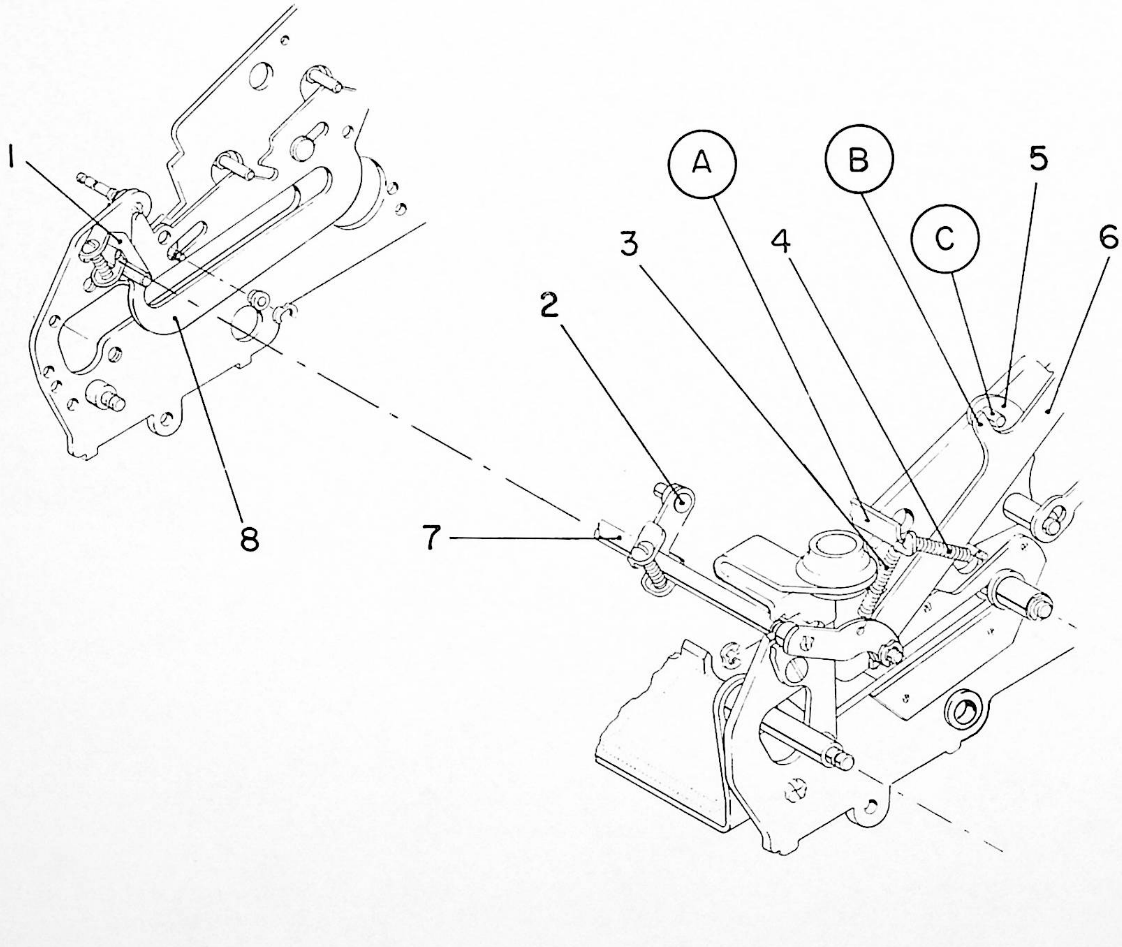
REHOOK TWO SPRINGS (4) TO REAR END OF UPPER KEYBOARD PLATE (5).

REPLACE FRONT ADD KEY (15).

WHEN REPLACING ADD CLUTCH CONTROL PARALLEL SHAFT (7) (PLATE 5), THE FOLLOWING STEPS SHOULD BE TAKEN:

1. PLACE LEFT ADDITION CONTROL PARALLEL ARM (1) TO REAR OF STUD IN CLUTCH CONTROL BAR (8).
2. PLACE STUDS IN ADDITION CONTROL PARALLEL ARMS (2) IN HOLES OF FRONT ADD KEY.
3. REPLACE EXTENSION (B) OF ADDITION CONTROL LINK (6) IN FRONT OF STUD (C) ON ADD KEY ACTUATED BELLCRANK (5).
4. INSTALL KEEPER ON SHAFT (7) INSIDE RIGHT FRAME.

REHOOK ADD KEY ACTUATED BELLCRANK SPRING (4) AND ADD CLUTCH CONTROL PARALLEL SHAFT SPRINGS (3) TO EXTENSION (A) OF KEYBOARD.



INSPECTIONS AND ADJUSTMENTS

1. ALL CONTROL KEYS SHOULD BE PARALLEL.

   ADJ. FORM CONTROL KEYS.

2. AMOUNT KEYTOPS SHOULD NOT TOUCH EACH OTHER AND SHOULD APPEAR IN SAME PLANE.

   ADJ. FORM INDIVIDUAL KEYSTEMS. PRESS KEYTOPS COMPLETELY ON KEYSTEMS. IT MAY BE NECESSARY TO REPLACE KEYSTEM.

3. CONTROL BAR KEYTOPS IN NORMAL POSITION SHOULD ALL APPEAR IN SAME PLANE.

   ADJ. PRESS KEYTOPS COMPLETELY ON KEYSTEMS. IT MAY BE NECESSARY TO REPLACE KEYSTEM.

4. AMOUNT KEYS (5) (FIGURE 5) SHOULD HAVE .005" TO .015" FURTHER DOWNWARD MOVEMENT AFTER LOCKING UNDER ZERO STOP AND LOCK BARS (1).

   ADJ. CHECK KEYBOARD FRAME AND ZERO STOP AND LOCK BARS (1) FOR STRAIGHT. STRAIGHTEN KEYBOARD FRAME AND LOCK BARS (1).

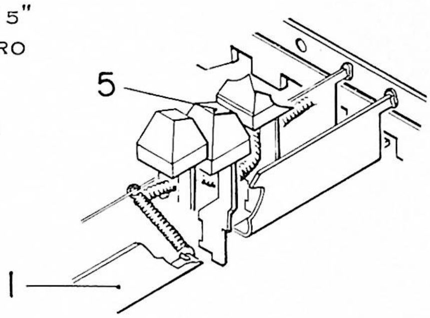


FIG. 5

5. WITH A FULL ROW OF AMOUNT KEYS (5) (FIGURE 6) DEPRESSED, TURN MACHINE THRU UNTIL PRINTING OCCURS. DISCONNECT MAIN RACK LOCK LINK FROM MAIN RACK LOCK (8) AND CHECK LOCK (8) FOR ENGAGING TEETH IN MAIN RACK (6) FREELY WITHOUT DRIVING RACKS TO FRONT OR REAR. CHECK ON ALL AMOUNT KEYS, 1 THRU 8.

   ADJ. FORM EXTENSION (A) OF LOWER KEYBOARD PLATE TO THE FRONT OR REAR. IT MAY BE NECESSARY TO FORM EXTENSION (C) OF INDIVIDUAL KEYSTEMS (5).

6. MACHINE NORMAL, ZERO STOPS (B) (FIGURE 7) SHOULD BE FULLY POSITIONED IN PATH OF EXTENSIONS (C) OF MAIN RACKS (6) AND CLEAR EXTENSIONS ON RACKS BY .010" TO .015". WITH AN AMOUNT KEY DEPRESSED, ZERO STOPS (B) SHOULD CLEAR RIGHT SIDE OF RACKS (6) BY .010" TO .020". CHECK ON ALL KEYS, 1 THRU 9.

   ADJ. FORM ZERO STOPS (B) TO THE RIGHT OR LEFT AND FRONT OR REAR.

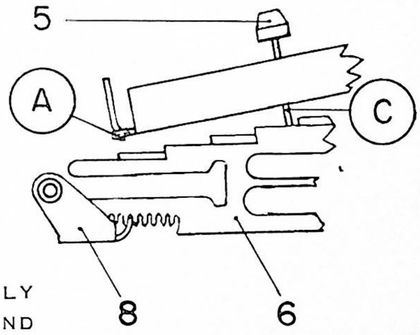


FIG. 6

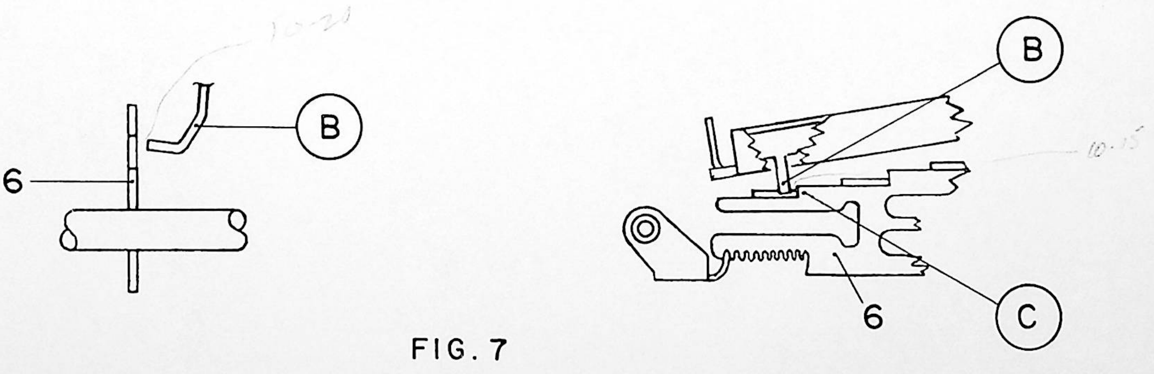


FIG. 7

7. CHECK LAST ZERO STOP (B) (FIGURE 7) ON LEFT FOR SAME CONDITIONS AS EXPLAINED IN INSPECTION #6. USE CORRECTION KEY (13) (FIGURE 8) FOR RELEASE POSITION.

ADJ. FORM ZERO STOP (B) TO THE RIGHT OR LEFT AND FRONT OR REAR.

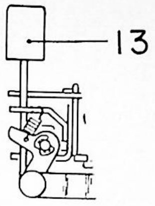


FIG. 8

8. CORRECTION KEY (13) (FIGURE 9) SHOULD CLEAR ALL AMOUNT KEYS (5) AT APPROXIMATELY THE SAME TIME.

ADJ. FORM EXTENSIONS (A) OF ZERO STOP AND LOCK BARS (1) WHERE THEY ENGAGE KEY RELEASE BAR (4).

9. CORRECTION KEY (13) SHOULD APPEAR IN SAME PLANE AS RIGHT ADD KEY.

ADJ. FORM EXTENSION (G) ON LOWER KEYBOARD FRAME UP OR DOWN.

10. ADD KEY DEPRESSED, HAND CRANK MACHINE THRU UNTIL ROLL (C) ON AUTOMATIC KEY RELEASE CAM FOLLOWER (7) IS ON HIGH CONTOUR OF AUTOMATIC KEY RELEASE CAM (8). AT THIS TIME, CHECK KEY RELEASE BAR (4) FOR SLIGHT ADDITIONAL MOVEMENT. MACHINE NORMAL, WITH A FULL ROW OF AMOUNT KEYS (5) DEPRESSED, DEPRESS CORRECTION KEY (13). AMOUNT KEYS SHOULD RELEASE AND CORRECTION KEY (13) SHOULD HAVE .060" FURTHER DOWNWARD MOVEMENT.

ADJ. FORM EXTENSION (B) OF KEY RELEASE LEVER (6) UP OR DOWN.

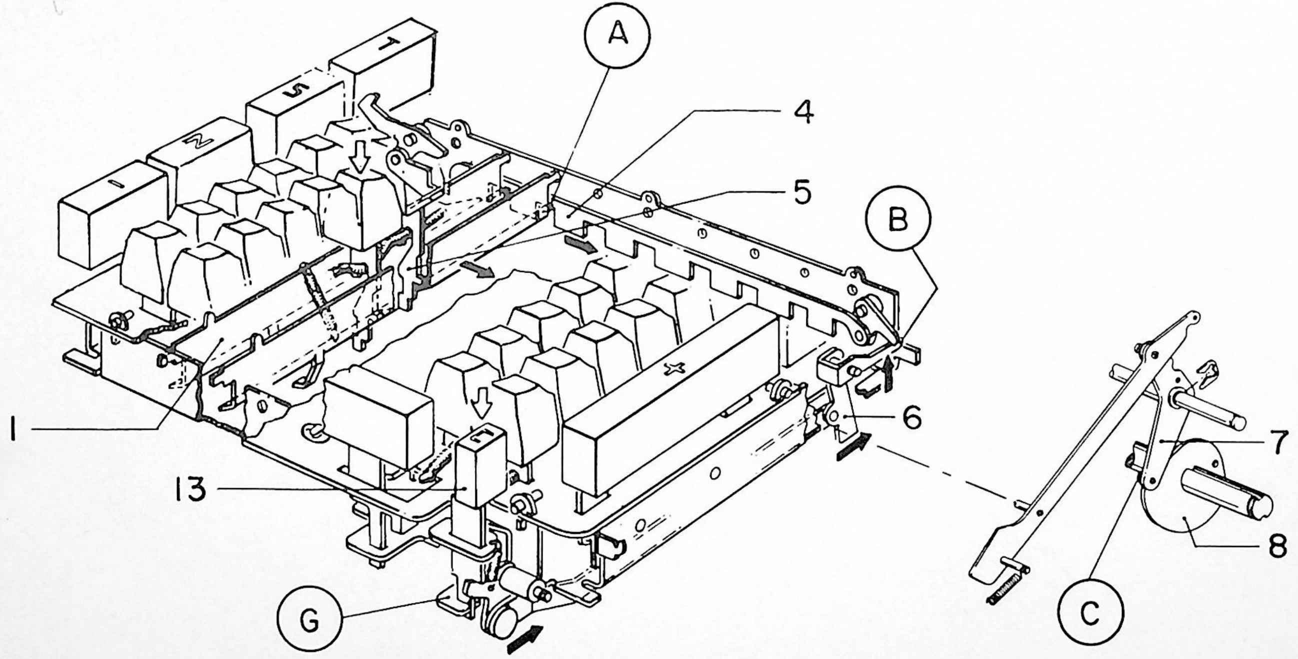


FIG. 9

CLUTCH ACTUATING MECHANISM

THE CLUTCH ACTUATING MECHANISM PROVIDES A MEANS TO START AND CONTROL A TIMED CYCLE OF MAIN CONTROL SHAFT, WHICH, IN TURN, OPERATES MECHANICAL LINKAGE TO PERFORM VARIOUS OPERATIONS.

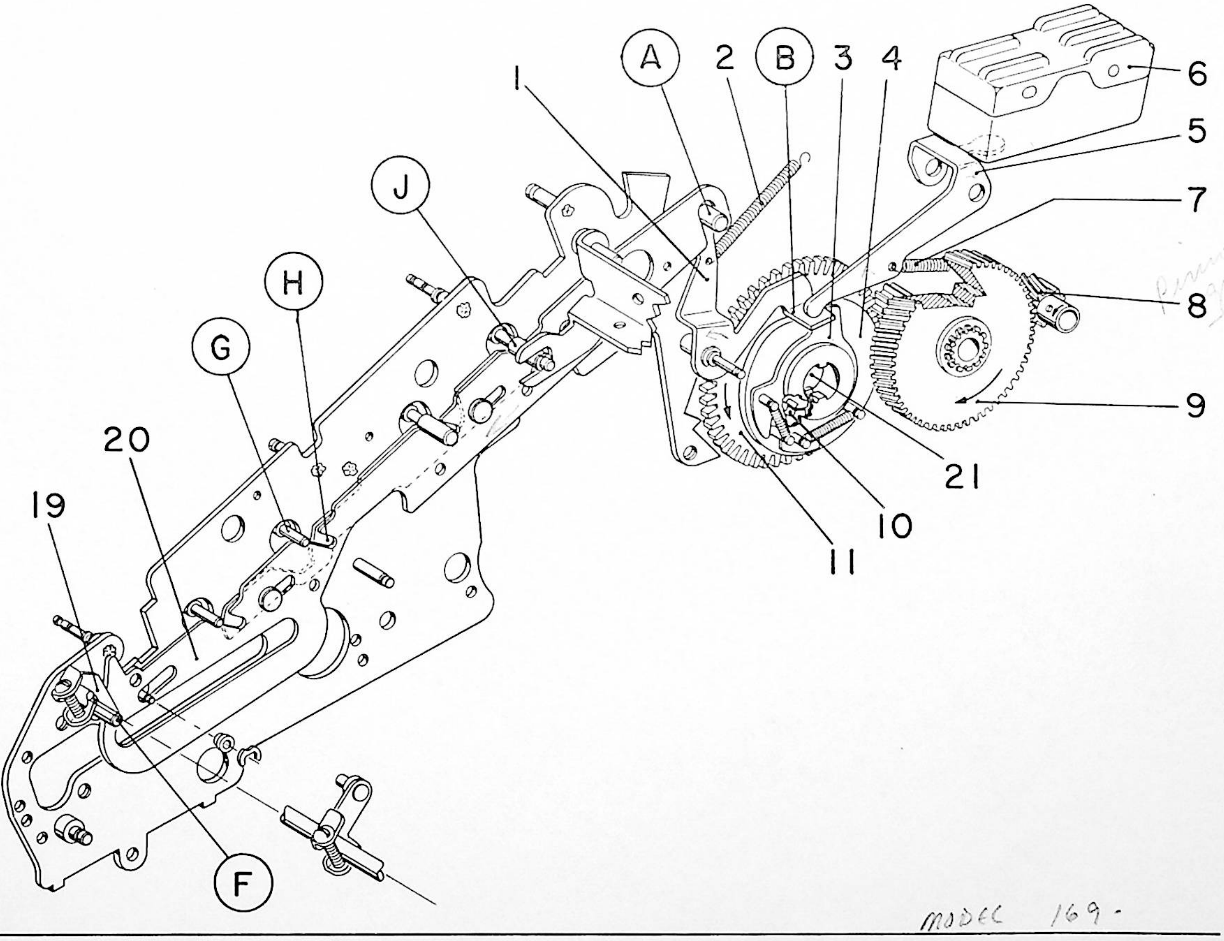
CLUTCH CONTROL BAR (20) (PLATE 6), MOUNTED ON INSIDE OF LEFT SIDE FRAME, IS ACTUATED BY ALL CONTROL KEYS BY MEANS OF BELLCRANKS OR REQUIRED LINKAGE TO ACTUATE CLUTCH AND TRIP THE MOTOR.

SUBTRACT, NON-ADD, SUB-TOTAL AND TOTAL KEY MECHANISM

DEPRESSION OF ANY ONE CONTROL KEY ON LEFT SIDE OF KEYBOARD WILL ACTUATE ONE OF FOUR CONTROL KEY BELLCRANKS TO ACTUATE CLUTCH CONTROL BAR (20) (PLATE 6).

FOUR ANGULAR SLOTS IN CLUTCH CONTROL BAR (20) ARE LOCATED DIRECTLY UNDER STUDS ON CONTROL KEY BELLCRANKS. SINCE THE OPERATION OF CLUTCH CONTROL BAR (20) FOR THESE KEYS IS IDENTICAL, THE NON-ADD CONTROL KEY WILL BE USED TO EXPLAIN THE OPERATION.

DEPRESSION OF NON-ADD CONTROL KEY CAUSES LOWER PORTION OF KEYSTEM TO CONTACT AND LOWER STUD (G) IN RESPECTIVE SLOT (H) OF CONTROL BAR (20), CAMMING CONTROL BAR FORWARD. FORK IN REAR END OF BAR (20) ENGAGED WITH STUD (A) IN CLUTCH CONTROL DOG (1), ROTATES DOG (1) COUNTER-CLOCKWISE, RELEASING EXTENSION (B) FROM CLUTCH RE-LEASE PLATE (3) ON 360° CLUTCH (4), PERMITTING CLUTCH PAWL (10) TO MESH WITH FREE-RUNNING CLUTCH GEAR (11) ON MAIN CONTROL SHAFT (21). EXTENSION (B) OF CLUTCH CONTROL DOG (1) WILL ALSO ACTUATE SWITCH OPERATING LEVER (5) WHICH PERMITS THE NORMALLY OPEN MICRO-SWITCH (6) TO CLOSE THE CIRCUIT AND START THE MOTOR.



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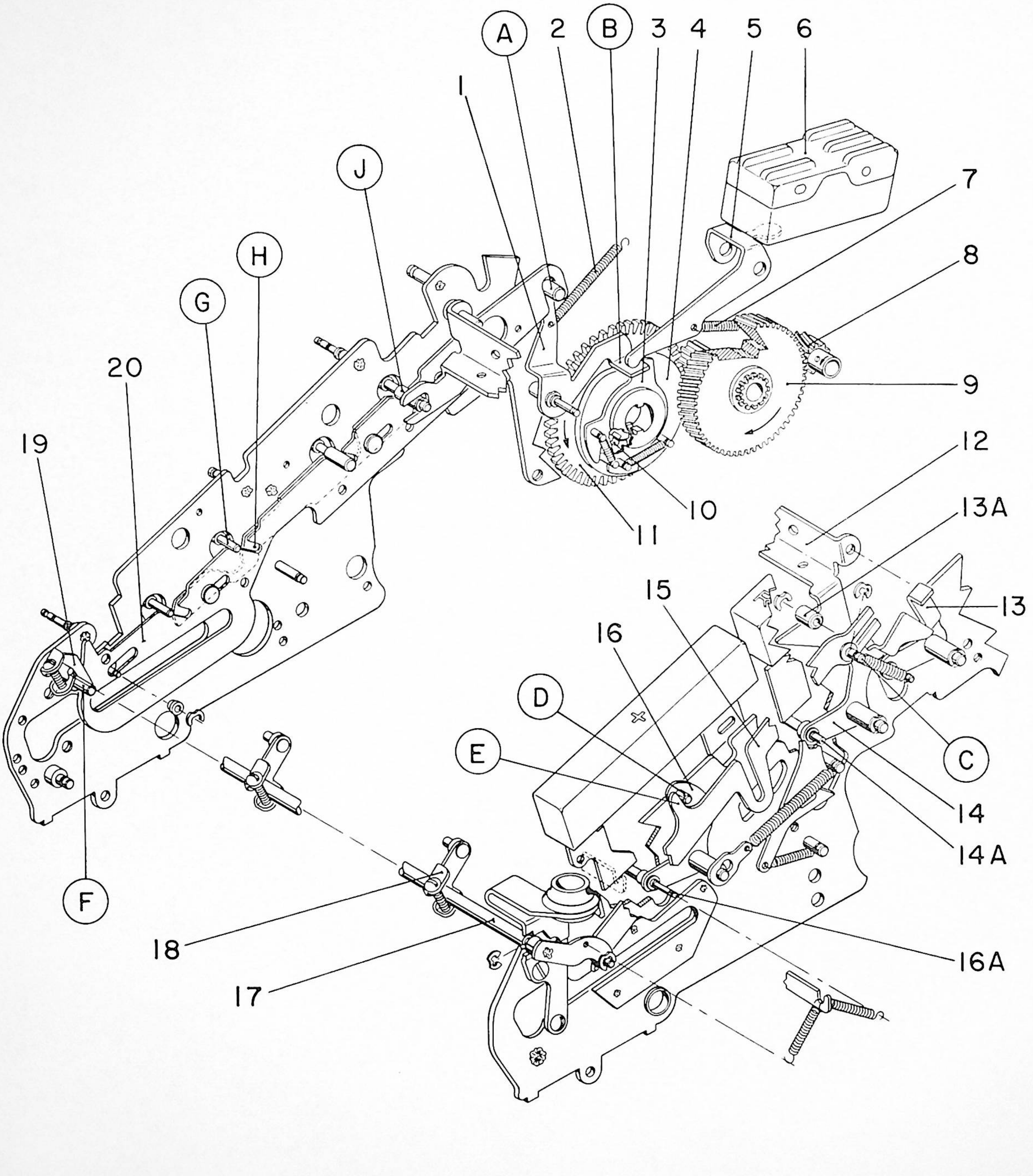


CLUTCH ACTUATING MECHANISM

AT THE END OF 360° MOTION OF MAIN CONTROL SHAFT, EXTENSION (B) (PLATE 7) ON CLUTCH CONTROL DOG (1) WILL DROP TO LOW SURFACE OF CLUTCH (4) WHICH WILL ALLOW CONTROL DOG (1) AND CLUTCH CONTROL BAR (20) TO RESTORE UNDER INFLUENCE OF SPRING (2). AT THIS TIME, EXTENSION (B) WILL CONTACT CLUTCH RELEASE PLATE (3), CAMMING CLUTCH PAWL (10) OUT OF CLUTCH GEAR (11) AND SWITCH OPERATING LEVER (5) RESTORES, OPENING MICRO-SWITCH TO SHUT OFF MOTOR.

DEPRESSION OF RIGHT TOTAL KEY CAUSES LOWER PORTION OF KEY TO CONTACT AND LOWER INNER STUD (13A) ON RIGHT TOTAL KEY BELLCRANK (13). THIS, IN TURN, WILL ROTATE TOTAL BAIL (12) (PLATE 7) COUNTER-CLOCKWISE AND, THRU FORK ON LEFT END OF BAIL ENGAGED WITH STUD (J) ON LEFT TOTAL KEY BELLCRANK, ROTATES LEFT TOTAL KEY BELLCRANK CAUSING STUD (J) TO ENTER SLOT IN CLUTCH CONTROL BAR (20) TO MOVE BAR FORWARD TO ACTUATE CLUTCH AND MICRO-SWITCH.

ADD AND REPEAT CONTROL MECHANISM

TWO ADD KEYS AND A REPEAT KEY ARE SO ARRANGED THAT, WITH THE AID OF BELLCRANKS, THEY CAN UTILIZE A COMMON LINKAGE TO OPERATE MACHINE.

DEPRESSION OF RIGHT ADD KEY CAUSES BOTTOM OF KEYSTEM TO CONTACT STUD (16A) ON INSIDE OF ADD KEY ACTUATED BELLCRANK (16) (PLATE 7). THIS WILL ROTATE BELLCRANK (16) COUNTER-CLOCKWISE, CAUSING UPPER STUD (D) TO CONTACT EXTENSION (E) OF ADDITION CONTROL LINK (15), MOVING IT FORWARD, WHICH ROTATES ADD CLUTCH PARALLEL SHAFT (17) CLOCKWISE.

ADDITION CONTROL CAMMING ARM (19) ON LEFT END OF SHAFT (17) CONTACTS STUD (F) IN CLUTCH CONTROL BAR (20), MOVING IT FORWARD. FORK IN REAR END OF BAR (20) ENGAGED WITH STUD (A) ON CLUTCH CONTROL DOG (1) ROTATES SAME COUNTER-CLOCKWISE. THIS WILL ACTUATE CLUTCH AND MICRO-SWITCH AS PREVIOUSLY EXPLAINED.

DEPRESSION OF FRONT ADD KEY ROTATES ADD CLUTCH PARALLEL SHAFT (17) THRU TWO ADDITION CONTROL PARALLEL ARMS (18) CLAMPED TO SHAFT (17). ADDITION CAMMING ARM (19) ON LEFT END OF SHAFT (17) CONTACTS STUD (F) IN CLUTCH CONTROL BAR (20)., MOVING IT FORWARD, PERFORMING THE SAME FUNCTION OF CLUTCH CONTROL DOG (1), CLUTCH RELEASE PLATE (3) AND SWITCH OPERATING LEVER (5).

DEPRESSION OF REPEAT KEY CAUSES LOWER PORTION TO CONTACT STUD (14A) ON INSIDE OF REPEAT KEY ACTUATED BELLCRANK (14), ROTATING BELLCRANK COUNTER-CLOCKWISE. UPPER STUD (C) IN REPEAT KEY ACTUATED BELLCRANK (14) RIDING IN SLOT OF ADDITION CONTROL LINK (15) MOVES LINK FORWARD WHICH ROTATES ADD CLUTCH PARALLEL SHAFT (17), PERFORMING SAME FUNCTION AS PREVIOUSLY EXPLAINED.

MOTOR DRIVE OPERATION

AS PREVIOUSLY EXPLAINED UNDER CLUTCH ACTUATING MECHANISM, THE DEPRESSION OF A CONTROL KEY ACTUATES CLUTCH CONTROL BAR (20) (PLATE 8) TO RELEASE CLUTCH PLATE (3) AND CLOSE MICRO-SWITCH (6) TO START MOTOR.

WHEN MOTOR OPERATES, A PINION GEAR (8) (MOUNTED ON LEFT END OF ARMATURE) IS MESHED WITH A COMPOUND DRIVE GEAR (9) WHICH, THROUGH ITS COMPONENT GEAR (9A), DRIVES THE FREE-RUNNING CLUTCH GEAR (11) ON THE MAIN CONTROL SHAFT (21).

AS CLUTCH GEAR (11) ROTATES, CLUTCH PAWL (10) ON 360° CLUTCH (4) WILL ENGAGE COMPONENT GEAR (11A) ON CLUTCH GEAR (11). DUE TO THE FACT THAT 360° CLUTCH IS KEYED TO MAIN CONTROL SHAFT (21), SHAFT WILL BE ROTATED COUNTER-CLOCKWISE 360°.

WHEN MAIN CONTROL SHAFT (21) STARTS TO ROTATE, HIGH CONTOUR OF CLUTCH (4) WILL MOVE UNDER EXTENSION (B) OF CLUTCH CONTROL DOG (1) TO KEEP IT ACTUATED TO HOLD CLUTCH CONTROL BAR (20) FORWARD. THIS, IN TURN, WILL TRAP STUD IN KEY ACTUATED BELLCRANK WITH CONTROL BAR (20); ALSO, SWITCH OPERATING LEVER (5) WILL BE TRAPPED TO KEEP MICRO-SWITCH (6) CLOSED UNTIL END OF CYCLE.

AS MAIN CONTROL SHAFT (21) REACHES END OF CYCLE, EXTENSION (B) WILL DROP TO LOW SURFACE OF CLUTCH PLATE (4) WHICH WILL ALLOW CLUTCH CONTROL DOG (1), CLUTCH CONTROL BAR (20) AND CONTROL KEY BELLCRANK TO RESTORE. AT THE SAME TIME, SWITCH OPERATING LEVER (5) WILL RESTORE THRU SPRING (7), PERMITTING MICRO-SWITCH TO OPEN, BREAKING THE CIRCUIT TO MOTOR AND EXTENSION (B) INTERCEPTS CLUTCH RELEASE PLATE (3), CAMMING CLUTCH PAWL (10) OUT OF CLUTCH GEAR (11A).

THERE ARE VARIOUS SHAPED CAMS MOUNTED ON MAIN CONTROL SHAFT (21) TO IMPART MOTION TO THEIR RELATED CAM FOLLOWERS. THE FUNCTION OF EACH CAM AND FOLLOWER WILL BE EXPLAINED IN CONTINUING SECTIONS.

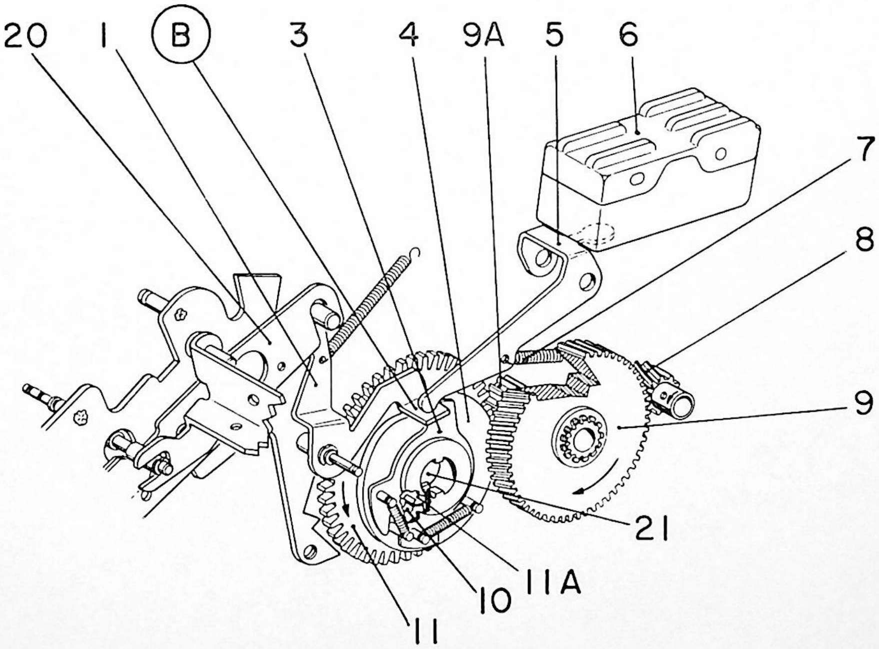


PLATE 8

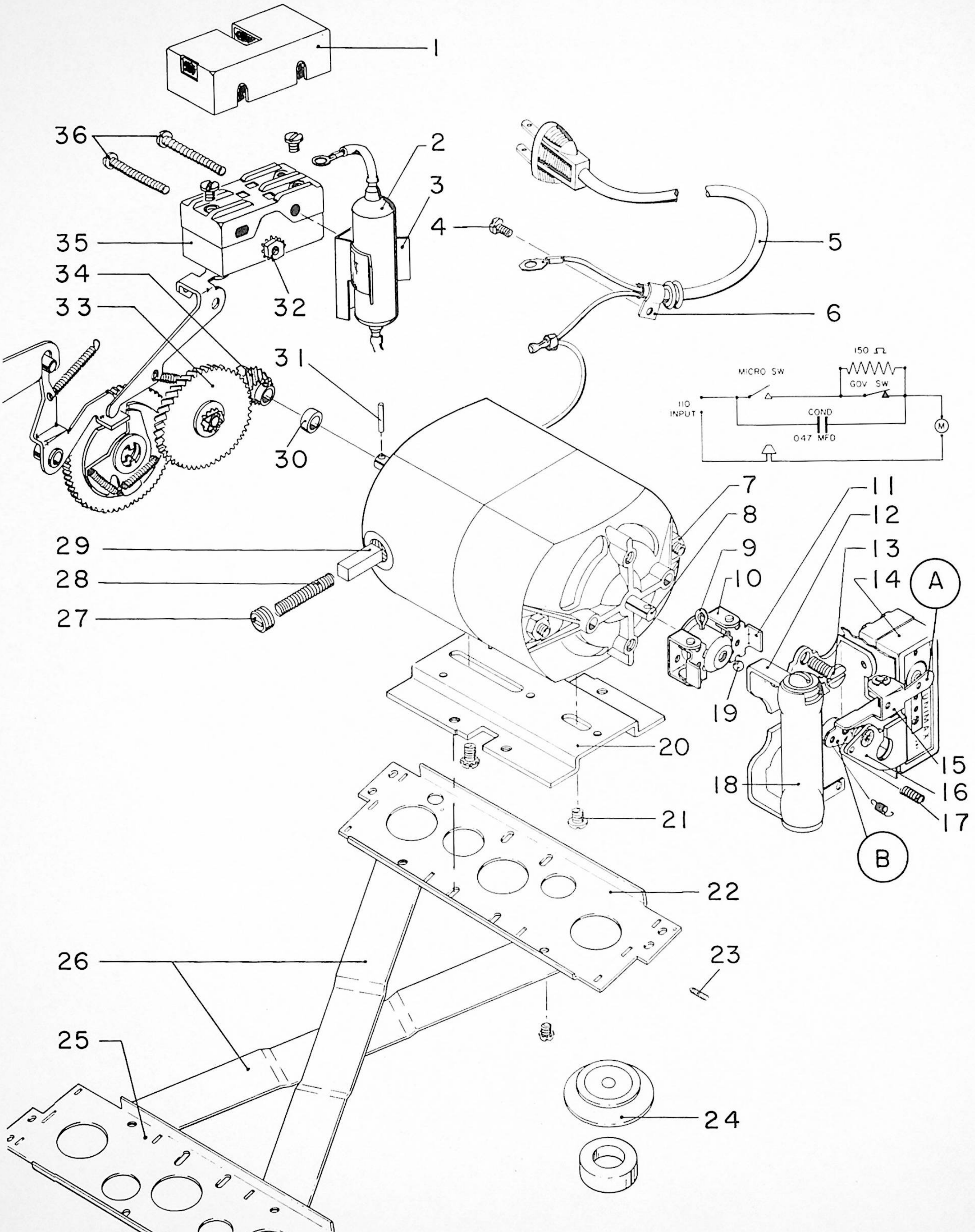


PLATE 9

MOTOR and GOVERNOR MECHANISM

MOTOR AND GOVERNOR OPERATION

MOTOR AND COMPONENTS

THE BASIC ADDING MACHINE IS POWERED WITH A 115 VOLT AC/DC UNIVERSAL TYPE MOTOR MOUNTED TO MOTOR MOUNTING BRACKET (20) (PLATE 9) WHICH IS MOUNTED TO LOWER REAR LATERAL BRACE (22) WITH FOUR SCREWS.

CONDENSER (2) IS SHUNTED ACROSS GOVERNOR TO REDUCE ARCING OF GOVERNOR CONTACTS. (SEE SCHEMATIC) A SHORT CIRCUIT IN CONDENSER WILL CUT GOVERNOR OUT AND PERMIT MOTOR TO RUN FULL SPEED.

CONDENSERS MAY BE TESTED FOR SHORT CIRCUIT, WHEN NOT IN MACHINE, BY CONNECTING THEM IN SERIES WITH A TEST LAMP. IF THE LIGHT ILLUMINATES, THE CONDENSER IS SHORT-CIRCUITED.

ON 110 VOLT MOTORS, USE A CONDESNER WHICH IS .5 MFD CAPACITY. ON 220 VOLT MOTORS, USE A CONDENSER WHICH IS .25 MFD CAPACITY. (REFER TO PARTS CATALOG)

RESISTORS (18) ARE USED TO PREVENT EXCESSIVE ARCING OF GOVERNOR CONTACTS, CAUSING MOTOR TO RUN SMOOTHER AND QUIETER. 110 VOLT MOTORS REQUIRE A 150 OHM RESISTOR, 220 VOLT MOTORS REQUIRE A 500 OHM RESISTOR.

GOVERNOR OPERATION

THE SPEED OF THE MOTOR IS CONTROLLED BY A CENTRIFUGAL TYPE GOVERNOR CONSISTING OF GOVERNOR SWITCH CONTROL LEVER (15), CENTRIFUGAL LEVERS (11), GOVERNOR MICRO-SWITCH (14) AND GOVERNOR BALL (19).

AS MOTOR OPERATES, CENTRIFUGAL FORCE WILL URGE CENTRIFUGAL LEVERS (11) OUTWARD, CAUSING GOVERNOR BALL (19) TO OPERATE GOVERNOR SWITCH CONTROL LEVER (15), OVERCOMING THE TENSION OF COMPRESSION SPRING (17) AND OPENING CONTACTS IN GOVERNOR MICRO-SWITCH (14), BREAKING THE CIRCUIT. WHEN THE CIRCUIT IS BROKEN, MOTOR SLOWS DOWN, DECREASING TENSION OF COMPRESSION SPRING (17), AGAIN PERMITTING GOVERNOR CONTACTS TO MAKE AND COMPLETE THE CIRCUIT. THE SPEED OF THE MOTOR IS THEREFORE DEPENDENT UPON THE AMOUNT OF TENSION ON COMPRESSION SPRING (17). THE MORE TENSION PUT ON SPRING (17), THE FASTER MOTOR WILL RUN TO BUILD UP CENTRIFUGAL FORCE TO OVERCOME THE INCREASED TENSION OF SPRING (17). THE OPENING AND CLOSING TAKES PLACE WITH SUCH RAPIDITY THAT THE SPEED OF THE MOTOR WILL REMAIN CONSTANT.

REMOVAL OF MOTOR AND GOVERNOR

REMOVE PAPER ROLL AND SHAFT.

REMOVE REAR LATERAL BRACE (1) (FIGURE 9A) BY REMOVING FOUR PINS (2).

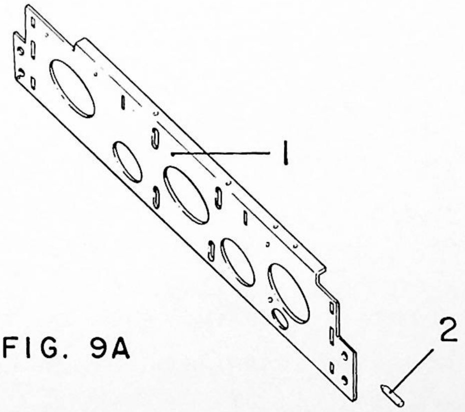


FIG. 9A

REMOVE MOTOR COVER.

LOOSEN SCREW (4) (PLATE 9) IN MOTOR CORD CLAMP (6) TO FREE MOTOR CORD (5) FROM LEFT SIDE FRAME.

REMOVE TWO REAR RUBBER FEET (24) FROM LOWER REAR LATERAL BRACE (22).

REMOVE TWO CROSS BRACES (26) BY REMOVING TWO SCREWS FROM LOWER REAR LATERAL BRACE (22) AND TWO SCREWS FROM FRONT LATERAL BRACE (25).

REMOVE TWO SCREWS (2) (FIGURE 10) FROM MAIN RACK SUPPORT SHAFT BRACE (1).

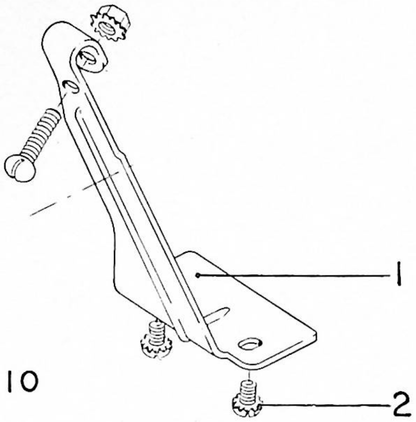


FIG. 10

DISENGAGE CONDENSER (2) (PLATE 9) FROM CONDENSER MOUNTING BRACKET (3).

REMOVE MICRO-SWITCH (35), MICRO-SWITCH INSULATOR (1) AND CONDENSER MOUNTING BRACKET (3) BY REMOVING TWO SCREWS (36) AND NUTS (32).

REMOVE TWO PINS (23) FOR LOWER REAR LATERAL BRACE (22) AND DISENGAGE BRACE FROM EXTENSIONS ON SIDE FRAMES. REMOVE MOTOR AND LATERAL BRACE COMPLETE.

DISMANTLING OF MOTOR

REMOVE COTTER KEY (9) FOR GOVERNOR CENTRIFUGAL LEVER BRACKET (10) AND REMOVE TWO SCREWS (13) IN GOVERNOR CONTROLS MOUNTING BRACKET (12). REMOVE LEVERS (11), GOVERNOR BALL (19) AND BRACKET (12).

REMOVE MOTOR BRUSH CAPS (27), SPRINGS (28) AND BRUSHES (29).

REMOVE PIN (31) IN MOTOR DRIVE PINION (34) AND REMOVE PINION AND BUSHING (30).

REMOVE LOWER LATERAL BRACE (22) FROM MOTOR MOUNTING BRACKET (20) BY REMOVING FOUR SCREWS.

REMOVE MOTOR MOUNTING BRACKET (20) BY REMOVING TWO SCREWS (21).

REMOVE TWO MOTOR HOUSING NUTS (7) AND SPLIT MOTOR HOUSING.

REMOVE ARMATURE (8), BEING CAREFUL NOT TO LOST SPACER AT EACH END.

REASSEMBLY OF MOTOR

REPLACE ARMATURE (8).

JOIN TWO MOTOR HOUSINGS WITH LOCKWASHERS AND NUTS (7).

REPLACE MOTOR DRIVE PINION (34) AND BUSHING (30). REPLACE PIN (31).

REPLACE MOTOR BRACKET (20) WITH TWO SCREWS (21). NOTE THAT LONG SCREW HAS A LOCKWASHER AND IS LOCATED ON LEFT END OR PINION END OF MOTOR.

REPLACE MOTOR BRUSHES (29) WITH CURVED SURFACE IN SAME RELATION AS CURVATURE OF ARMATURE. REPLACE SPRINGS (28) AND CAPS (27).

REPLACE GOVERNOR CENTRIFUGAL LEVER ASSEMBLY (10) ON ARMATURE SHAFT WITH COTTER KEY (9).

REPLACE GOVERNOR BALL (19) IN HOLE OF GOVERNOR CENTRIFUGAL LEVER BRACKET (10).

REPLACE GOVERNOR SWITCH CONTROLS BRACKET (12) WITH TWO SCREWS (13).

REPLACE LOWER LATERAL BRACE (22) ON MOTOR BRACKET (20) WITH FOUR SCREWS.

REPLACE LOWER LATERAL BRACE (22) AND MOTOR IN MACHINE, MESHING PINION GEAR (34) WITH COMPOUND DRIVE GEAR (33) AND PLACING MAIN RACK SUPPORT SHAFT BRACE (1) (FIG. 10) TO OUTSIDE OF BRACE (22) (PLATE 9). SEAT LATERAL BRACE ON EXTENSIONS OF FRAMES AND REPLACE TWO PINS (23) IN SIDE FRAMES AND TWO SCREWS (2) (FIGURE 10) IN SUPPORT BRACE (1).

MOUNT MICRO-SWITCH (35) (PLATE 9), MICRO-SWITCH INSULATOR (1) AND CONDENSER MOUNTING BRACKET (3) TO LEFT SIDE FRAME WITH SCREWS (36) AND NUTS (32). SNAP CONDENSER (2) IN BRACKET (3).

PLACE MOTOR CORD IN MOTOR CORD CLAMP (6) AND TIGHTEN SCREW (4).

REPLACE TWO CROSS BRACES (26) WITH FOUR SCREWS WITH OFFSETS IN BRACES IN A DOWNWARD POSITION.

REPLACE TWO RUBBER FEET (24) IN LOWER REAR LATERAL BRACE (22) BY USING SCREWDRIVER TO WORK FEET INTO BRACE.

REPLACE MOTOR COVER IN POSITION.

REPLACE REAR LATERAL BRACE (1) (FIGURE 9A) WITH FOUR PINS (2) WITH FORMED TIPS TO THE OUTSIDE AND GOVERNOR MICRO-SWITCH INSULATOR IN POSITION.

INSPECTIONS AND ADJUSTMENTS

For 169

1. WITH ANY CONTROL KEY FULLY DEPRESSED, EXTENSION (B) (FIGURE 11) ON CLUTCH CONTROL DOG (1) SHOULD CLEAR TOP OF CLUTCH (4) AND CLUTCH RELEASE PLATE (3) BY .030".

   ADJ. FORM EXTENSION (B) OF CLUTCH CONTROL DOG (1) UP OR DOWN.
   NOTE: ADJUST TO THE KEY HAVING THE LEAST AMOUNT OF LIFT.

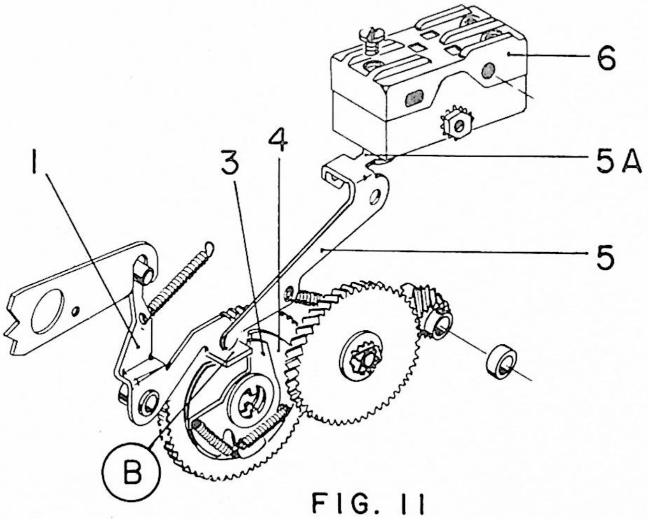


FIG. 11

2. WHEN CONTROL KEY IS DEPRESSED, MOTOR MICRO-SWITCH (6) (FIGURE 11) SHOULD TRIP SIMULTANEOUSLY WITH RELEASING OF CLUTCH RELEASE PLATE (3).

   ADJ. RAISE OR LOWER MOTOR MICRO-SWITCH (6) OR FORM EAR (5A) ON SWITCH OPERATING LEVER (5).

3. FRONT ADD KEY SHOULD HAVE APPROXIMATELY .060" FURTHER DOWNWARD MOVEMENT AFTER CLUTCH IS RELEASED. MACHINE NORMAL, THERE SHOULD BE .040" CLEARANCE BETWEEN ADDITION CONTROL CAMMING ARM (19) (FIGURE 12) AND STUD (F) IN FRONT END OF CLUTCH CONTROL BAR (20).

ADJ. FORM ADDITION CONTROL PARALLEL SHAFT (17) ON LEFT END BETWEEN THE TWO FLATS ON SHAFT (17).

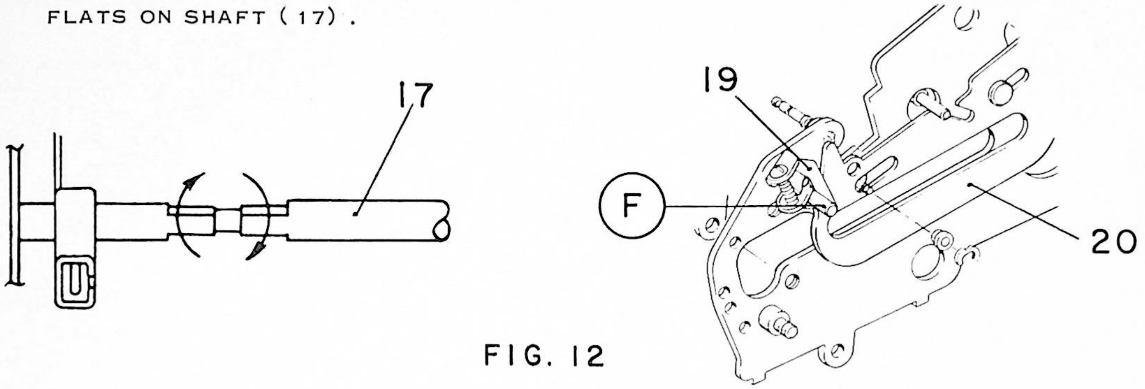


FIG. 12

4. WITH GOVERNOR BALL (19) (FIGURE 13) DEPRESSED AGAINST ARMATURE SHAFT, THERE SHOULD BE .020" CLEARANCE BETWEEN BALL AND EAR (B) ON GOVERNOR SWITCH CONTROL LEVER (15).

ADJ. FORM EXTENSION (A) OR (B) ON GOVERNOR SWITCH CONTROL LEVER (15).

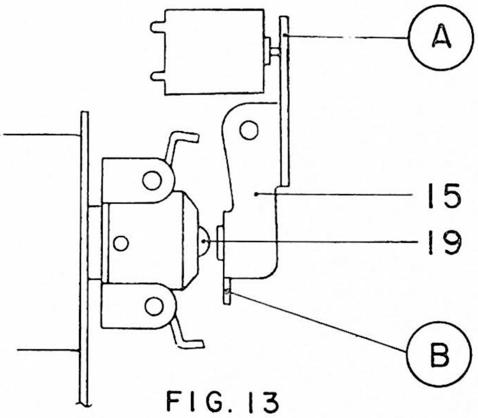


FIG. 13

5. CHECK MOTOR DRIVE PINION (34) (FIGURE 14) FOR FULL SIDEWAYS HOLD ON COMPOUND DRIVE GEAR (33) AND MINIMUM PLAY BEFWEEN PINION (34) AND GEAR (33).

ADJ. ADJUST BY LOOSENING MOTOR MOUNTING SCREWS AND REPOSITION MOTOR.

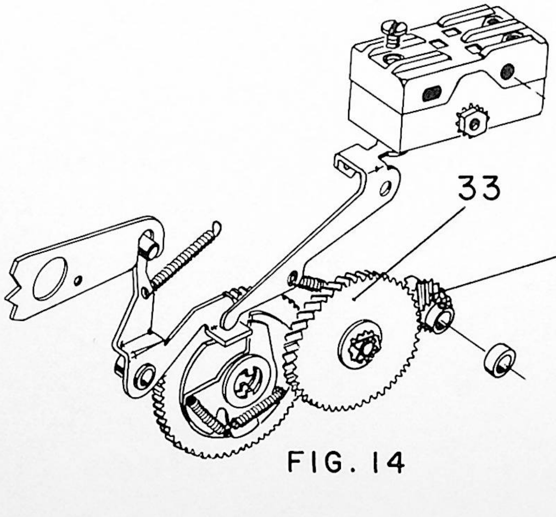


FIG. 14

6. SPEED OF MACHINE SHOULD BE 150 STROKES PER MINUTE. TO CHECK, DEPRESS #2 AMOUNT KEY IN UNITS COLUMN AND HOLD REPEAT KEY DOWN FOR 30 SECONDS.

ADJ. FORM GOVERNOR SWITCH CONTROL BRACKET (16) (FIGURE 15) IN OR OUT TO INCREASE OR DECREASE TENSION ON COMPRESSION SPRING (17).

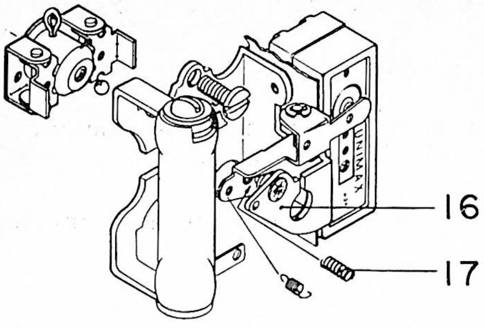


FIG. 15

7. RIGHT TOTAL KEY SHOULD HAVE APPROXIMATELY .060" FURTHER DOWNWARD MOVEMENT AFTER RELEASING CLUTCH.

ADJ. FORM TOTAL BAIL (12).

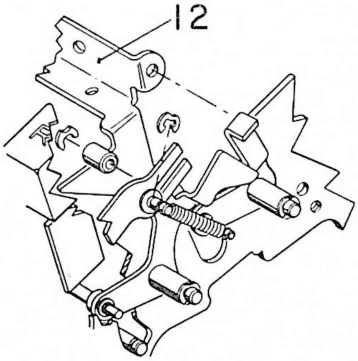


FIG. 16

8. A. AUTOMATIC KEY RELEASE LINK (9) SHOULD CENTER AND WORK FREELY BETWEEN TOTAL BAIL (12) AND SIDE FRAME.

ADJ. FORM LINK (9) TO ALIGN.

B. HOLDING UP THUMB ADD BAR, DEPRESS REPEAT KEY (11) AND CHECK FOR .040" MOVEMENT BETWEEN STUD (A) AND FORK IN ADD CONTROL LINK (15).

ADJ. OPEN OR CLOSE SLOT IN ADD CONTROL LINK (15).

C. AT END OF REPEAT CYCLE, POINT (C) ON AUTOMATIC KEY RELEASE LINK LATCH (14) SHOULD MEET DEAD CENTER OF STUD (B).

ADJ. OPEN OR CLOSE SLOT IN AUTOMATIC KEY RELEASE LINK LATCH (14).

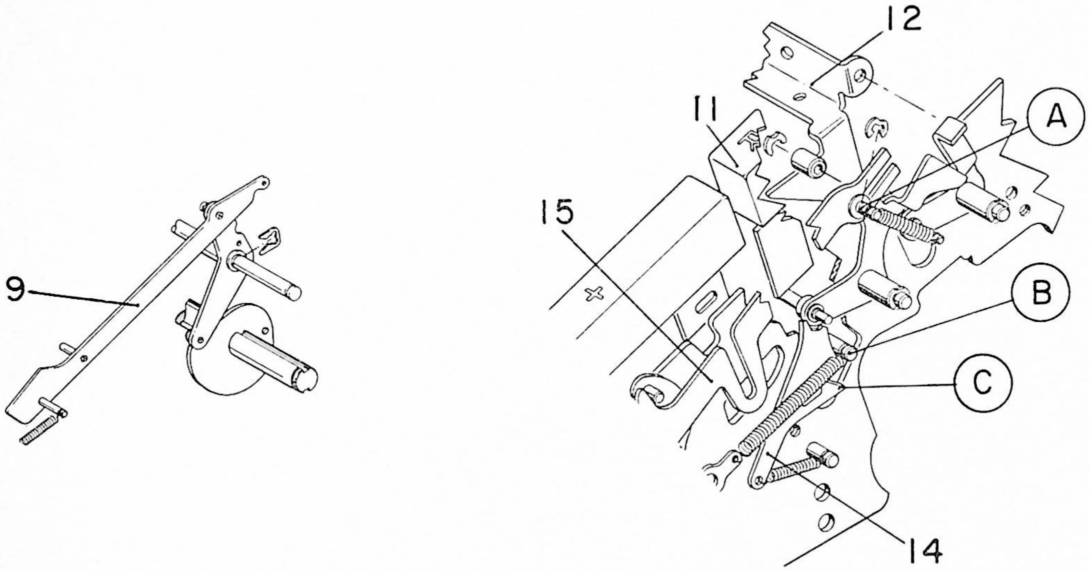
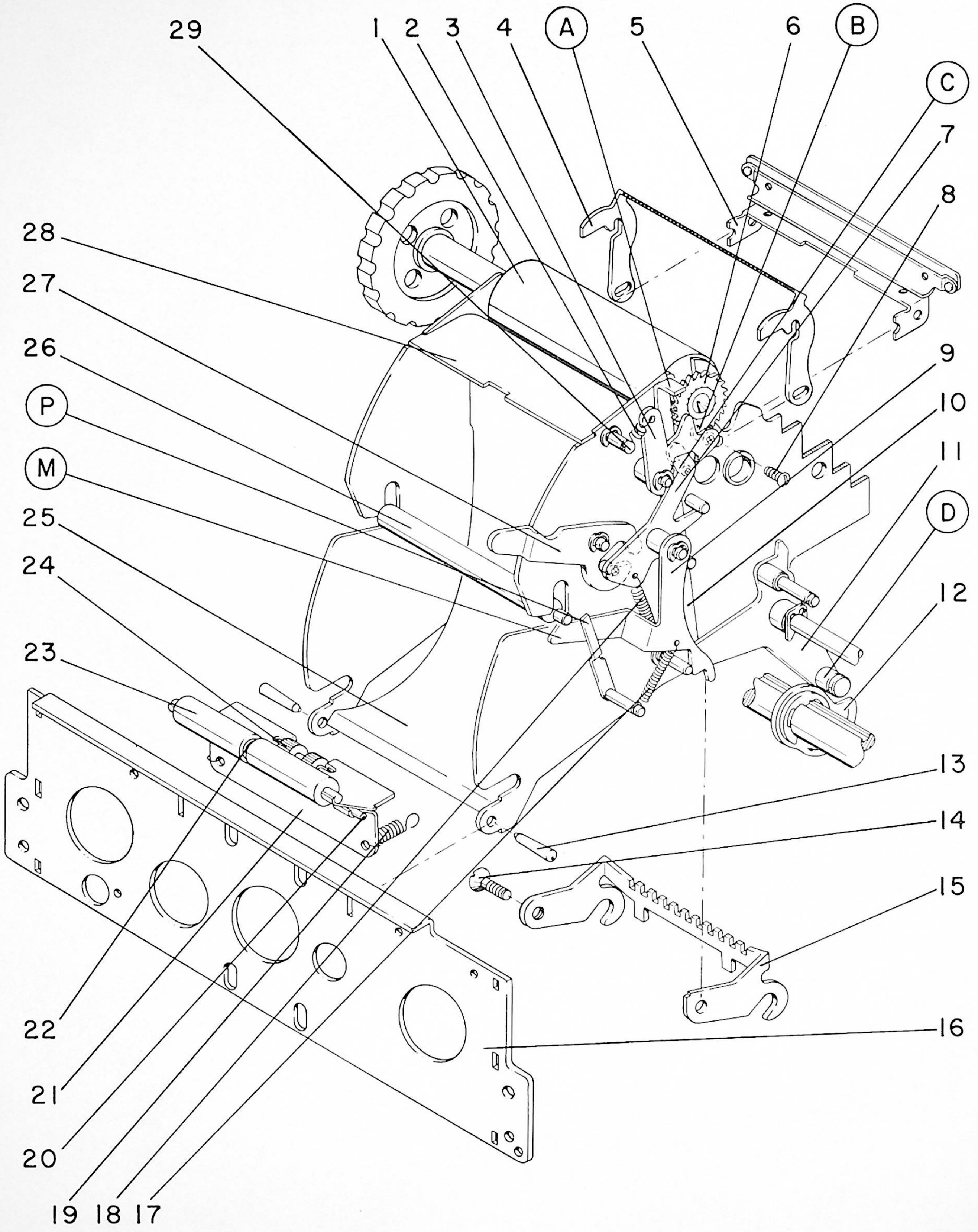


FIG. 17

THE FOLLOWING PAGES (35 THROUGH 59) COVER INSTRUCTIONS FOR REMOVING, DISASSEMBLY, REASSEMBLY AND ADJUSTING OF THE PRINTER. THEY ALSO COVER FUNCTION AND OPERATION OF SYMBOL CONTROL MECHANISM.


A
B
C
P
M
D

PRINTER

THE PRINTER CONSISTS OF TWO PARALLEL FRAMES WHICH SUPPORT AND GUIDE SEVERAL MECHANISMS. THESE MECHANISMS CONSIST OF PAPER FEED, RIBBON FEED AND REVERSE, RIBBON POSITIONING AND PRINTING MECHANISMS. PAPER FEED WILL BE DISCUSSED HERE; WITH OTHER SUBJECTS BEING COVERED UNDER INDIVIDUAL SUBJECT HEADINGS.

PAPER FEED

PAPER FEED MECHANISM CONSISTS OF FRONT PRESSURE ROLL (24) (PLATE 10), AND REAR PRESSURE ROLL (23) SUPPORTED BY PAPER GUIDE (21), PLATEN (1), STATIONARY PAPER GUIDE (5) AND CERTAIN LINKS AND LEVERS, AFFIXED TO LEFT PRINTER SIDE FRAME, WHICH SPACE THE PLATEN ONE OR THREE SPACES, AS THE CASE MAY BE.

PAPER ROLL IS SUPPORTED AT REAR OF PRINTER, BETWEEN PRINTER FRAMES BY A REMOVABLE SHAFT (26). PAPER IS INSTALLED SO PAPER WILL UNROLL FROM BOTTOM OF PAPER ROLL OVER REAR PRESSURE ROLL (23) AND BETWEEN PLATEN (1) AND FRONT PRESSURE ROLL (24). PAPER WILL BE GUIDED BY STATIONARY PAPER GUIDE (5) TO POSITION IT BETWEEN PAPER TEAR-OFF BAR (4) AND PLATEN (1).

TWO SPRINGS (19) CONNECTED BETWEEN PAPER GUIDE (21) AND PAPER TEAR-OFF BAR MOUNTING SCREWS (8) KEEP FRONT PRESSURE ROLL (24) IN CONSTANT CONTACT WITH PAPER. UNDER NORMAL CIRCUMSTANCES, PAPER IS FED BY PRESSURE EXERTED BY FRONT PRESSURE ROLL (24) AGAINST PAPER AND PLATEN (1). HOWEVER, IF SOMETHING CAUSES AN EXCESSIVE LOAD ON PAPER ROLL, REAR PRESSURE ROLL (23) WILL BE PULLED DOWN WHICH PIVOTS PAPER GUIDE (21) ON SHAFT (20) CAUSING FRONT PRESSURE ROLL (24) TO INCREASE PRESSURE ON PAPER AND PLATEN (1).

LIST OPERATION

FOR EACH LISTING OPERATION, PAPER SPACING MECHANISM SPACES TAPE ONE SPACE. THIS WILL PLACE ALL LISTINGS (ADDITIONS, SUBTRACTIONS AND NON-ADDS) DIRECTLY UNDER EACH OTHER.

AT THE END OF FIRST HALF OF LIST CYCLE, LISTED ITEMS WILL BE PRINTED ON TAPE. ON SECOND HALF OF LIST CYCLE, HIGH CONTOUR OF PLATEN INDEXING CONTROL CAM (12) CONTACTS ROLL (D) ON PLATEN INDEXING CAM FOLLOWER (11) ROTATING CAM FOLLOWER (11) PULLING PLATEN SPACING LINK (10) DOWNWARD. EAR (A) ON LINK (10) WILL PICK UP ONE TOOTH ON PLATEN RATCHET (6) TURNING PLATEN (1) ONE SPACE FORWARD. AS PLATEN (1) IS TURNED, ROLL (B) ON PLATEN CENTRALIZING LEVER (3) WILL MOVE INTO NEXT TOOTH OF RATCHET (6) AND, THRU SPRING (2), HOLDS PLATEN (1) IN POSITION. NEAR THE END OF LIST CYCLE, ROLL (D) ON PLATEN INDEXING CAM FOLLOWER (11) WILL MOVE TO LOW CONTOUR OF PLATEN INDEXING CONTROL CAM (12) ALLOWING CAM FOLLOWER (11) AND PLATEN INDEXING LINK (10) TO RESTORE TO NORMAL, THRU SPRING (18).

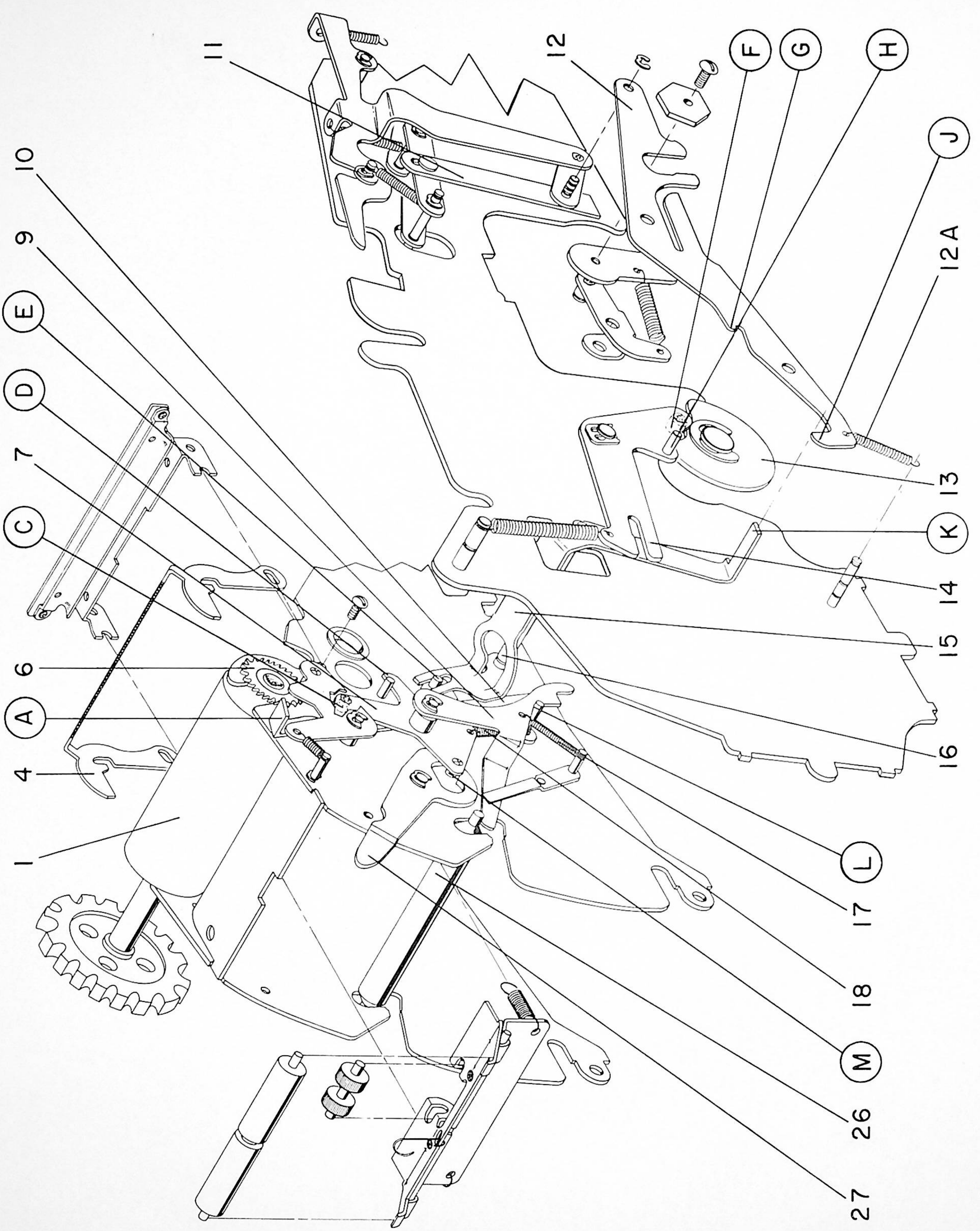


PLATE 11 PAPER FEED (TOTAL OPERATION)

TOTAL OPERATION

ON TOTAL OR SUB-TOTAL OPERATIONS, ACCUMULATION OF LISTED ITEMS WILL BE PRINTED DIRECTLY UNDER LAST LISTED ITEM. PAPER WILL BE SPACED THREE SPACES ON THESE OPERATIONS TO POSITION PRINTED ITEM ABOVE PAPER TEAR-OFF BAR (4)(PLATE 11).

WHEN TOTAL OR SUB-TOTAL KEY IS DEPRESSED, ZERO STOP CONTROL LINK CONNECTOR (11) IS MOVED DOWNWARD WHICH ROTATES ZERO STOP ACTUATING LINK (12), POSITIONING STEP (G) OF SAME IN PATH OF STUD (H) ON SUB-TOTAL CAM FOLLOWER (14). AT THE SAME TIME, HOOK (J) AT REAR OF LINK (12) IS POSITIONED UP BEHIND EXTENSION (K) ON PLATEN INDEXING BAIL (15).

AT START OF MAIN CONTROL SHAFT CYCLE, SUB-TOTAL CONTROL CAM (13) WILL CONTACT ROLL (F) ON SUB-TOTAL CAM FOLLOWER (14), ROTATING IT CLOCKWISE. STUD (H) WILL CONTACT STEP (G) AND DRIVE ZERO STOP ACTUATING LINK (12) FORWARD, CAUSING HOOK (J) OF LINK (12) TO CONTACT EXTENSION (K) OF PLATEN INDEXING BAIL (15), ROTATING IT COUNTER-CLOCKWISE. FORK ENGAGED WITH STUD (E) IN PLATEN INDEXING CONTROL LEVER (7) ROTATES LEVER (7) CLOCKWISE, MOVING STUD (C) AWAY FROM PLATEN INDEXING LINK (10) PERMITTING EAR (A) TO PICK UP #3 TOOTH OF PLATEN RATCHET (6).

AT THE END OF FIRST HALF OF CYCLE, ITEM WILL BE PRINTED ON TAPE. ON THE SECOND HALF OF CYCLE, HIGH CONTOUR OF PLATEN INDEXING CONTROL CAM (12)(PLATE 10) WILL CONTACT ROLL (D) ON PLATEN INDEXING CAM FOLLOWER (11), ROTATING CAM FOLLOWER (11), PULLING PLATEN SPACING LINK (10) DOWNWARD. EAR (A) ON LINK (10) WILL PICK UP THIRD TOOTH ON PLATEN RATCHET (6), SPACING PLATEN (1) FORWARD THREE SPACES, PLACING PRINTED ITEM ABOVE PAPER TEAR-OFF BAR (4). AS PLATEN (1) IS TURNED, ROLL (B) ON PLATEN CENTRALIZING LEVER (3) WILL MOVE INTO TOOTH OF RATCHET (6) AND, THRU SPRING (2), HOLDS PLATEN IN POSITION. NEAR THE END OF CYCLE, ROLL (D) ON PLATEN INDEXING CAM FOLLOWER (11) WILL MOVE TO LOW CONTOUR OF PLATEN INDEXING CONTROL CAM (12) ALLOWING IT AND PLATEN INDEXING LINK (10) TO RESTORE TO NORMAL THRU SPRING (18).

ALSO, AT END OF CYCLE, ROLL (F)(PLATE 11) ON SUB-TOTAL CAM FOLLOWER (14) FALLS TO LOW CONTOUR OF SUB-TOTAL CONTROL CAM (13), PERMITTING ZERO STOP ACTUATING LINK (12), PLATEN INDEXING BAIL (15) AND PLATEN INDEXING CONTROL LEVER (7) TO RESTORE THRU SPRINGS (12A) AND (18). AS LEVER (7) RESTORES, STUD (C) WILL RESTORE PLATEN SPACING LINK TO THE ONE SPACE POSITION DUE TO EXTENSION (D) OF LEVER (7) LIMITING ON STUD IN LEFT PRINTER SIDE FRAME.

PAPER SPACING CUT-OFF MECHANISM

A PLATEN SPACING LINK BLOCK ARM (9) IS INSTALLED ON STUD IN LEFT PRINTER SIDE FRAME TO PROTECT PAPER SPACING MECHANISM IN EVENT PAPER SUPPLY IS EXHAUSTED OR PAPER BECOMES TAUT, SUCH AS WHEN PAPER IS GLUED TO PAPER ROLL CORE.

WHEN PAPER BECOMES TAUT, OR PAPER SUPPLY IS EXHAUSTED, PAPER ROLL SHAFT (26) WILL BE RAISED, RELEASING BLOCK ARM (9), PERMITTING IT TO MOVE OVER STUD (L) IN PLATEN SPACING LINK THRU SPRING (17) WHEN LINK IS PULLED DOWNWARD ON FOLLOWING OPERATION. BLOCK ARM (9) WILL HOLD LINK DOWNWARD, WHICH, IN TURN, WILL HOLD ROLL (D)(PLATE 10) ON PLATEN INDEXING CAM FOLLOWER (11) AWAY FROM PLATEN INDEXING CONTROL CAM (12), PREVENTING FURTHER SPACING OPERATIONS UNTIL NEW ROLL OF PAPER IS INSTALLED.

TRIPLE SPACE CONTROL LEVER

PAPER IS NORMALLY FED ONE SPACE ON LISTING OPERATIONS; HOWEVER, MACHINES EQUIPPED WITH TRIPLE SPACE CONTROL LEVER (27)(PLATE 11) ALLOW PAPER TO TRIPLE SPACE ON ALL LISTING OPERATIONS. THIS IS ACCOMPLISHED IN THE FOLLOWING MANNER:

WHEN TRIPLE SPACE CONTROL LEVER (27) IS MOVED DOWNWARD, CAMMING SURFACE CONTACTS STUD (M) IN PLATEN INDEXING CONTROL LEVER (7), ROTATING SAME CLOCKWISE. THIS MOVES STUD (C) IN LEVER (7) AWAY FROM PLATEN INDEXING LINK, PERMITTING LINK TO MOVE FORWARD SO EAR (A) WILL PICK UP THIRD TOOTH OF PLATEN RATCHET (6) AND, AS MACHINE OPERATES, LOWERING PLATEN SPACING LINK (10), PLATEN (1) WILL BE ROTATED THREE SPACES.

1. PLATEN (1) (FIGURE 1) SHOULD BE SINGLE SPACED EXCEPT ON TOTAL OR SUB-TOTAL OPERATIONS. MACHINE NORMAL, PLATEN SPACING LINK (10) SHOULD LIE AGAINST STUD (C) ON PLATEN INDEXING CONTROL LEVER (7). WHEN LINK (10) IS DRIVEN DOWN ON LIST OPERATIONS, EAR (A) SHOULD CLEAR SECOND TOOTH ON PLATEN RATCHET (6) AND HAVE AT LEAST A .030" HOLD ON FIRST TOOTH OF RATCHET.

   ADJ. FORM EXTENSION (D) OF PLATEN INDEXING CONTROL LEVER (7) THAT CONTACTS STUD IN LEFT PRINTER SIDE FRAMES.

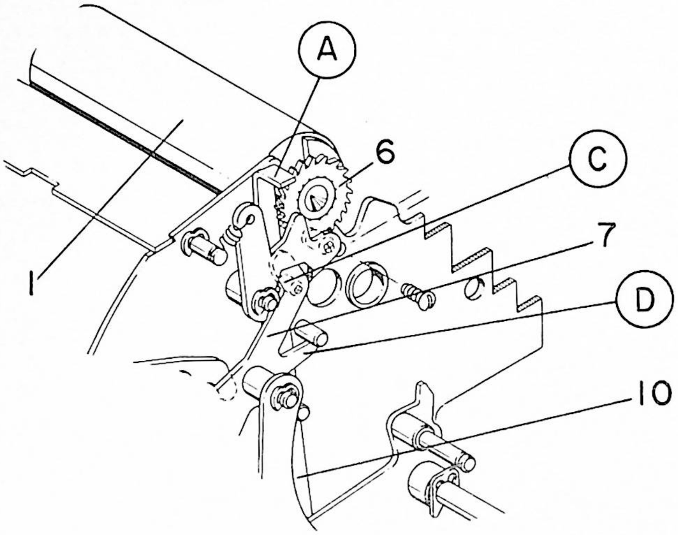


FIG. 1

2. WITH TOTAL OR SUB-TOTAL KEY DEPRESSED, MAIN CONTROL SHAFT ROTATED, ZERO STOP ACTUATING LINK (12) (FIGURE 2) SHOULD ROTATE PLATEN INDEXING CONTROL BAIL (15) AND PLATEN INDEXING CONTROL LEVER (7) FOR STUD (C) TO CLEAR PLATEN INDEXING LINK (10) TO ALLOW LINK (10) TO LIMIT ON PLATEN RATCHET HUB TO PERMIT EAR (A) TO PICK UP #3 TOOTH OF PLATEN RATCHET (6) TO TRIPLE SPACE PLATEN.

   ADJ. FORM EXTENSION (K) ON PLATEN INDEXING BAIL (15). ? Not for extension to the rear

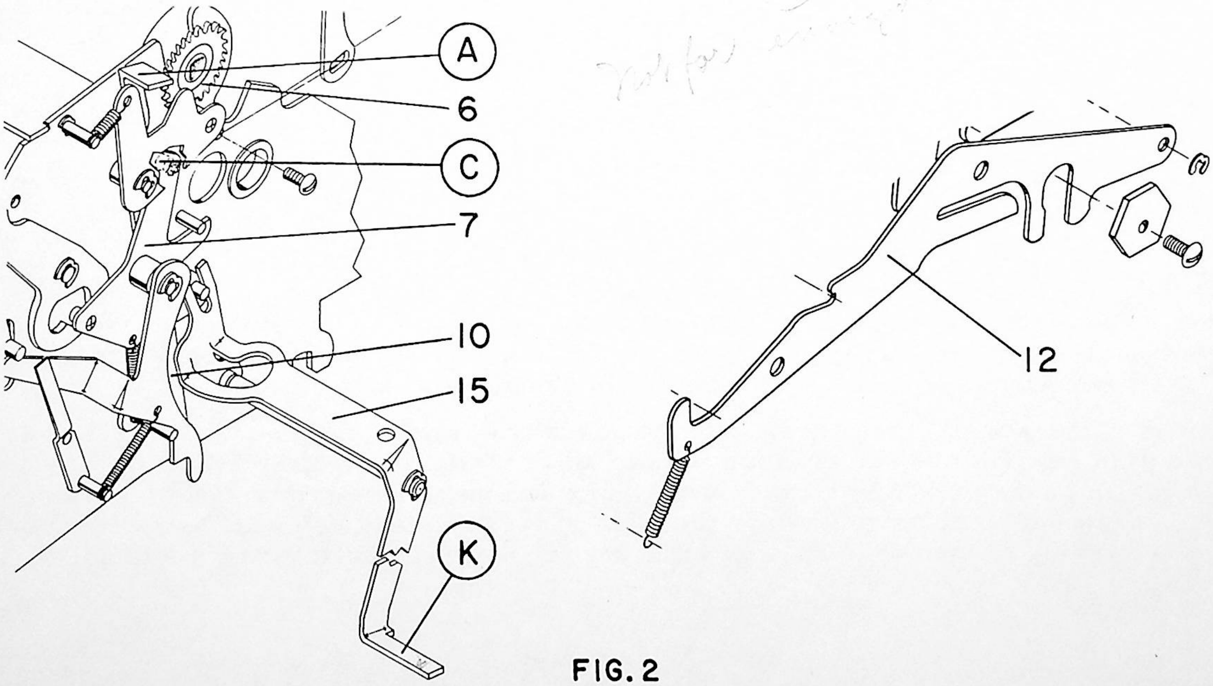


FIG. 2

3. PLATEN (1) (FIGURE 3) SHOULD NOT HAVE EXCESSIVE PLAY IN SLOTS IN PRINTER FRAMES.

ADJ. LOOSEN MOUNTING SCREWS (8) FOR PAPER CUT-OFF BAR (4) AND REPOSITION BAR.

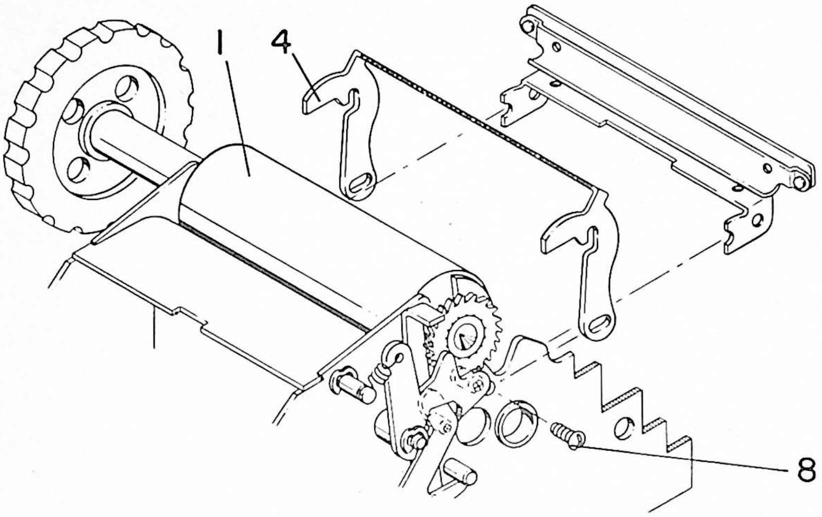


FIG. 3

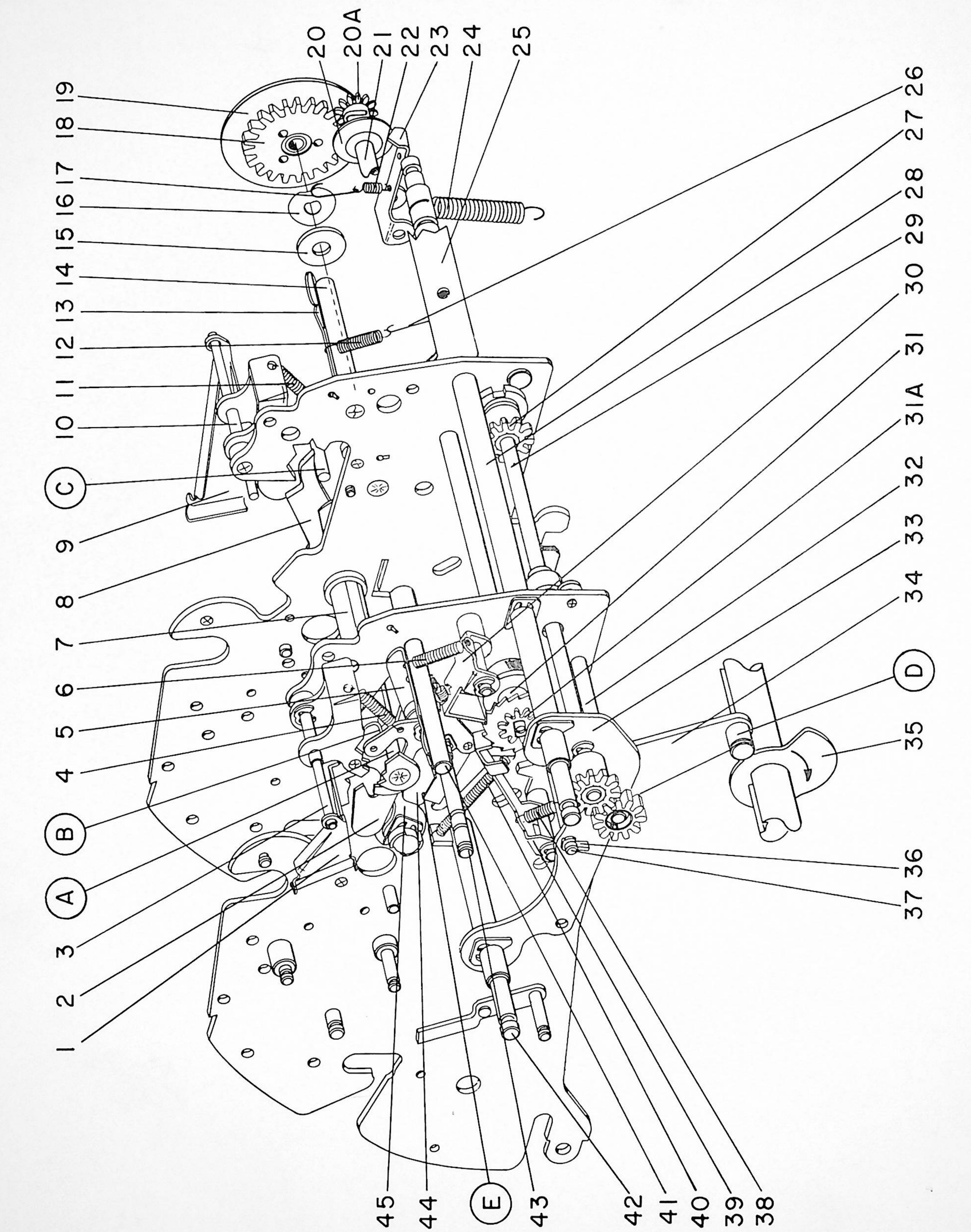


PLATE 12 RIBBON MECHANISM

RIBBON FEED, POSITIONING AND REVERSE MECHANISM

THE RIBBON MECHANISM PROVIDES MEANS OF FEEDING RIBBON AND WINDING IT ON LEFT AND RIGHT RIBBON SPOOLS, A WAY OF REVERSING DIRECTION IN WHICH RIBBON TRAVELS TO WIND ON THESE SPOOLS AND RIBBON POSITIONING MECHANISM TO RAISE RIBBON INTO POSITION BETWEEN PRINTING DIALS AND PAPER.

RIBBON FEED

RIBBON FEED MECHANISM CONSISTS OF RIBBON FEED SHAFT (21) (PLATE 12) WITH RIBBON RATCHET GEAR HUB (31) ON LEFT END AND RIBBON FEED DETENT (20) ON RIGHT END, RIBBON FEED PAWL (39), NON-REVERSE DETENT PAWL (30) AND RIBBON FEED DETENT PAWL (23).

RIBBON FEED SHAFT (21) TURNS IN ONE DIRECTION ONLY AND WHEN SHAFT IS DETENTED TO RIGHT, GEAR (20A) ON RIBBON FEED DETENT (20) WILL BE ENGAGED WITH GEAR (18) ON RIGHT RIBBON SPOOL GEAR AND FLANGE ASSEMBLY (19) AND RIBBON WILL WIND ON RIGHT SPOOL. LIKEWISE, WHEN RIBBON FEED GEAR (31A) IS MESHED WITH GEAR ON LEFT RIBBON SPOOL GEAR AND FLANGE ASSEMBLY, RIBBON WILL WIND ON LEFT SPOOL.

RIBBON FEED PAWL (39) MOUNTED ON PLATEN INDEXING CAM FOLLOWER (34) OSCILLATES FRONT AND REAR ON EACH MACHINE CYCLE. SPRING (38) KEEPS RIBBON FEED PAWL (39) ENGAGED WITH RIBBON FEED RATCHET (31) AT ALL TIMES. NEAR END OF MACHINE CYCLE, PLATEN INDEXING CONTROL CAM (35) CONTACTS ROLL (D) ON PLATEN INDEXING CAM FOLLOWER (34), ROTATING SAME COUNTER-CLOCKWISE WHICH, IN TURN, MOVES RIBBON FEED PAWL (39) REARWARD. RIBBON FEED PAWL (39), AS IT MOVES REARWARD, WILL PICK UP TOOTH IN RIBBON FEED RATCHET (31) AND ROTATE RIBBON FEED SHAFT (21) ONE SPACE. AS RIBBON FEED RATCHET (31) IS TURNED, NON-REVERSE DETENT PAWL (30), ENGAGED WITH RATCHET AT ALL TIMES, MOVES BEHIND NEXT TOOTH OF RATCHET TO PREVENT RIBBON FEED SHAFT (21) FROM BACKING UP WHEN RIBBON FEED PAWL (39) RESTORES TO PICK UP NEXT RATCHET TOOTH. WASHERS (15) AND SPRING WASHERS (16) ARE ASSEMBLED ON RIBBON SPOOL AXLES (43) TO PREVENT BACKLASH AND UNNECESSARY SLACK IN RIBBON.

RIBBON POSITIONING

RIBBON EXTENDS BETWEEN LEFT AND RIGHT RIBBON ARMS (1) AND (9) TO REAR OF PRINTING DIALS. MACHINE NORMAL, IT IS BELOW PRINTING POSITION AND RAISES INTO POSITION BETWEEN PRINTING DIALS AND PAPER WHEN PRINTER CONTROL SHAFT (7) ROTATES CLOCKWISE FOR PRINTING OPERATION.

MACHINE NORMAL, RIBBON IS HELD BELOW PRINTING POSITION BY RIGHT ARM (8) OF PRINTER CONTROL SHAFT (7) AND FORMED EAR (B) OF LEFT RIBBON REVERSING ARM (45). THESE TWO POINTS CONTACT STUDS (A) AND (C) ON RIBBON ARMS, LEFT (1) AND RIGHT (9).

WHEN PRINTER CONTROL SHAFT (7) ROTATES CLOCKWISE, LEFT RIBBON REVERSING ARM (45) AND RIGHT ARM (8) ARE RAISED. TENSION OF SPRINGS (4) AND (11) RAISES RIBBON ARMS LEFT (1) AND RIGHT (9), WHICH, IN TURN, RAISE RIBBON, POSITIONING IT BETWEEN PRINTING DIALS AND PAPER. THE UPWARD TRAVEL OF RIBBON ARMS IS RESTRICTED BY RIBBON ARM STOP (2), LEFT AND RIGHT. AFTER PRINTING OCCURS, PRINTER CONTROL SHAFT (7) WILL RESTORE AND, THRU RIGHT ARM (8) AND LEFT RIBBON REVERSING ARM (45), RIBBON AND RIBBON ARMS WILL BE LOWERED.

RIBBON REVERSE

RIBBON REVERSES DIRECTION WHEN THE SUPPLY OF RIBBON ON EITHER LEFT OR RIGHT RIBBON SPOOL HAS BEEN EXHAUSTED. BEFORE EXPLAINING A RIBBON REVERSE OPERATION, WE WILL DETERMINE THE FOLLOWING CONDITIONS:

1. EAR (E) (FIGURE 4) ON RIBBON REVERSE LEVER LINK RIDES IN SLOT OF RIBBON REVERSING CAM ARM (44) AND EXTENDS ON THRU SLOT TO BE LOCATED IN PATH OF RIBBON REVERSING ARM (45).

2. RIBBON DETENT PAWL (23) (FIGURE 5) HOLDS RIBBON FEED SHAFT (21) IN LATERAL DETENTED POSITION UNTIL SUCH TIME AS IT IS DRIVEN TO LEFT OR RIGHT.

3. WHEN RIGHT RIBBON FEED GEAR (20A) IS ENGAGED WITH RIGHT RIBBON SPOOL GEAR (18), THE LEFT RIBBON SPOOL IS DISENGAGED AND VICE-VERSA.

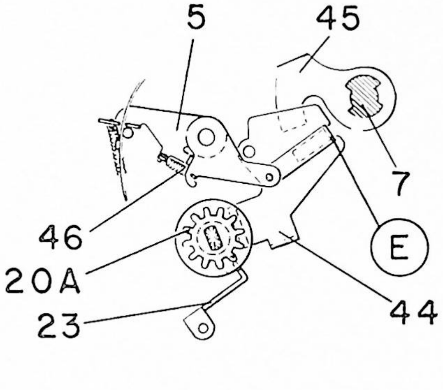


FIG. 4

LOCATED APPROXIMATELY 4-1/2 INCHES FROM EITHER END OF RIBBON IS A METAL EYELET. AS THE RIBBON UNWINDS FROM EITHER LEFT OR RIGHT RIBBON SPOOL, METAL EYELET COMES IN CONTACT WITH UNDERSIDE OF RIBBON REVERSING YIELDABLE LEVER (5) (FIGURE 4) AND, THRU SPRING (46), PIVOTS REVERSING YIELDABLE ARM CLOCKWISE, PULLING RIBBON REVERSING LEVER LINK FORWARD UNTIL EAR (E) LIMITS ON RIBBON REVERSING ARM (45).

AS PRINTER CONTROL SHAFT (7) ROTATES CLOCKWISE, RIBBON REVERSING ARM (45) WILL BE RAISED, ALLOWING EAR (E) TO MOVE TO FRONT IN PATH OF RIBBON REVERSING ARM (45). WHEN PRINTER CONTROL SHAFT (7) RESTORES, RIBBON REVERSING ARM (45) WILL BE LOWERED. THIS WILL CAUSE ARM TO CONTACT EAR (E), FORCING RIBBON REVERSING CAM ARM (44) (FIGURE 5) DOWN, WEDGING CAMMING SURFACE OF THIS ARM BETWEEN PRINTER SIDE FRAME AND RIBBON FEED DETENT (20) OR RIBBON RATCHET GEAR HUB (31), CAUSING RIBBON FEED SHAFT (21) TO SHIFT LATERALLY TO ENGAGE GEAR (20A) OF RIBBON FEED DETENT (20) OR GEAR (31A) OF RIBBON RATCHET GEAR HUB (31) WITH LEFT OR RIGHT RIBBON SPOOL GEAR (18). RIBBON FEED DETENT PAWL (23) WILL HOLD RIBBON FEED SHAFT (21) IN POSITION UNTIL SUCH TIME AS IT IS AGAIN DRIVEN TO LEFT OR RIGHT.

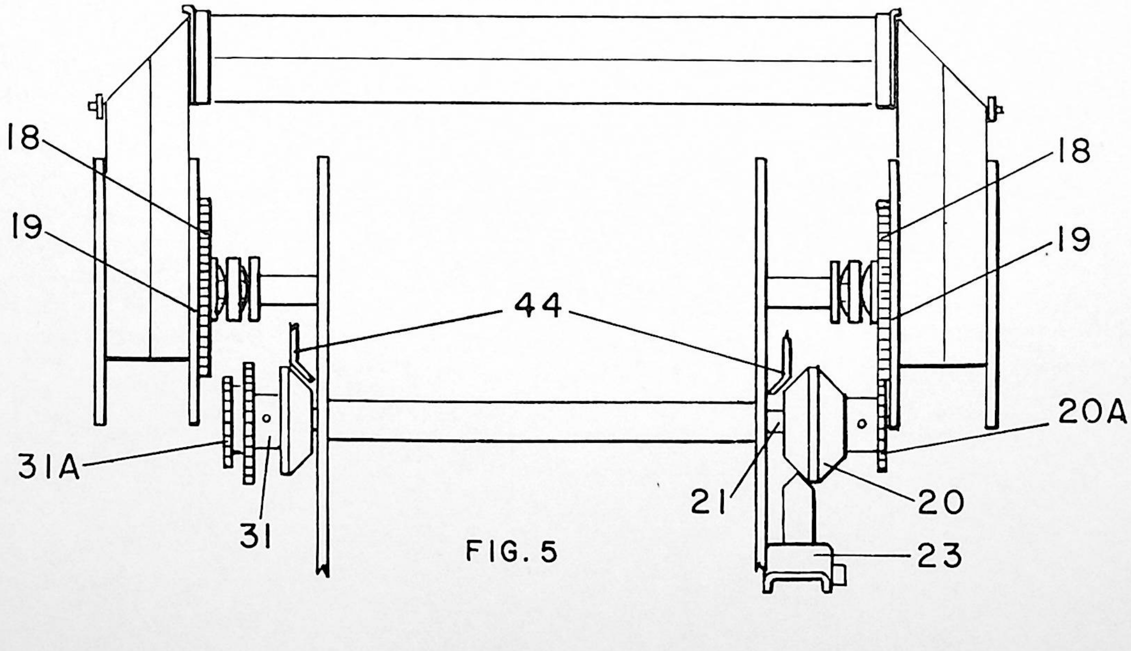


FIG. 5

REPLACING OF RIBBON

A NEW RIBBON IS MOUNTED ON LEFT AND RIGHT RIBBON SPOOL AXLES (43) (PLATE 12) SO RIBBON WILL WIND AND UNWIND FROM BOTTOM OF SPOOL. WHEN SPOOL IS INSTALLED, EARS ON RIBBON SPOOL SHANK ENTER HOLES IN RIBBON SPOOL GEAR AND FLANGE ASSEMBLIES (19) AND ARE SECURED BY SLIDING RIBBON SPOOL KEEPER IN GROOVE IN RIBBON SPOOL AXLE (43).

RIBBON IS THREADED, LEFT TO RIGHT, IN THE FOLLOWING MANNER: UNWIND APPROXIMATELY 18 INCHES OF RIBBON FROM NEW SPOOL. MOUNT NEW SPOOL ON LEFT RIBBON SPOOL AXLE (43). THREAD RIBBON IN FRONT OF LOWER RIBBON STUD (41), IN SLOT OF LEFT RIBBON REVERSE LEVER (5), OVER LEFT RIBBON ARM PIVOT STUD (3), OVER LEFT RIBBON ARM (1), ACROSS TO RIGHT RIBBON ARM (9), FORWARD OVER RIGHT RIBBON ARM PIVOT STUD (10), IN SLOT OF RIGHT RIBBON REVERSE LEVER (13), IN FRONT OF LOWER RIBBON STUD (14). WITH RIGHT RIBBON SPOOL IN PLACE, BUT NOT LOCKED IN POSITION, AND SPEARHEADS ON SHANK POINTING DOWN, FASTEN ONE-HALF INCH OF RIBBON ON SPEARHEAD. WIND RIBBON COUNTER-CLOCKWISE ONTO RIGHT SPOOL UNTIL METAL EYELET IS BELOW RIBBON REVERSE LEVER (13). LOCK RIGHT RIBBON SPOOL ON AXLE.

RIBBON FEED INSPECTIONS AND ADJUSTMENTS

1. RIBBON SHOULD FEED FREELY THRU RIBBON REVERSE LEVERS (13) (FIGURE 6) WHEN FEEDING IN EITHER DIRECTION FROM ONE RIBBON SPOOL TO THE OTHER.

   ADJ. FORM RIBBON REVERSE LEVERS (13) UP AND DOWN, FRONT AND REAR TO PARALLEL THEM WITH STUDS (14) IN PRINTER FRAMES.

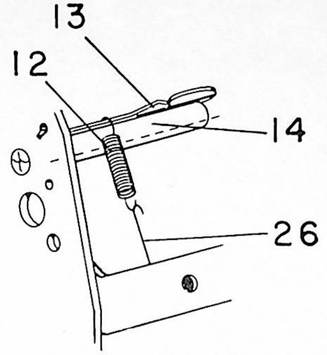


FIG. 6

2. SLIGHT TENSION SHOULD BE MAINTAINED IN RIBBON AT ALL TIMES.

   ADJ. INCREASE OR DECREASE FORM IN RIBBON TENSION SPRING WASHERS (16) (FIGURE 7) OR CHANGE SPRING WASHERS (16).

3. RIBBON FEED DETENT PAWL (23) (FIGURE 7) SHOULD HOLD FEED GEARS ON EITHER RIBBON FEED DETENT (20) OR RIBBON RATCHET GEAR HUB (31) INTO MESH WITH RIBBON SPOOL GEARS (18) WITH A FULL HOLD.

   ADJ. TWIST RIBBON FEED DETENT PAWL (23) NEAR ITS PIVOT STUD TO MOVE RIBBON FEED SHAFT (21) TO THE LEFT OR RIGHT.

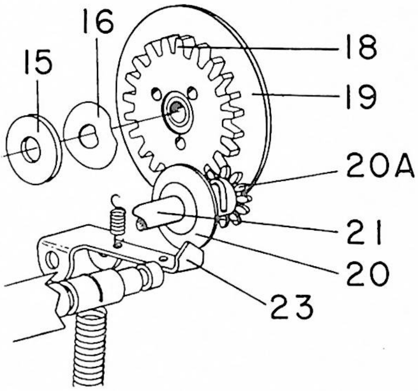


FIG. 7

4. RIBBON FEED PAWL (39) (FIGURE 8) AND NON-REVERSE DETENT PAWL (30) SHOULD HAVE A FULL HOLD LATERALLY WITH GEAR ON RIBBON RATCHET GEAR HUB (31) WHEN RIBBON FEED SHAFT IS POSITIONED TO EXTREME LEFT OR RIGHT.

   ADJ. FORM RIBBON FEED PAWL (39) AND NON-REVERSE DETENT PAWL (30) SIDEWAYS.

5A. MACHINE NORMAL, NON-REVERSE DETENT PAWL (30) (FIGURE 8) SHOULD HOLD RIBBON RATCHET GEAR HUB (31) IN POSITION FOR RIBBON FEED PAWL (39) TO PICK UP PROPER TOOTH ON GEAR TO ROTATE RIBBON FEED SHAFT ONE SPACE.

5B. MACHINE HAND CRANKED THRU, RIBBON FEED PAWL (39) SHOULD ROTATE GEAR ON RIBBON RATCHET GEAR HUB ONE FULL TOOTH AND OVER-LATCH TOOTH WITH NON-REVERSE DETENT PAWL (30).

   ADJ. FORM NON-REVERSE DETENT PAWL (30) TO EQUALIZE PICK UP AND OVERFEED.

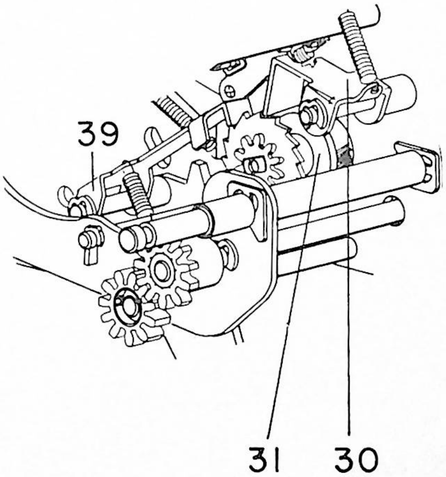


FIG. 8

6. WITH MACHINE HAND CRANKED THRU, RIBBON SHOULD BE RAISED IN PATH OF PRINTING LEVERS BUT NOT SO HIGH AS TO CAUSE FIGURES TO CUT OFF AT BOTTOM.

ADJ. FORM REAR EXTENSION OF RIBBON ARMS (1) (FIGURE 9) AND (9).

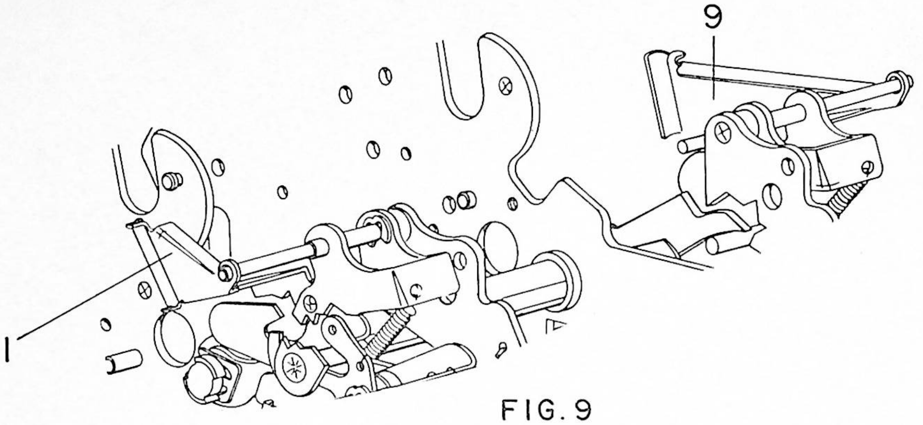


FIG. 9

RIBBON REVERSING CAM ARMS (44) (FIGURE 10), WHEN DRIVEN DOWNWARD, SHOULD MOVE RIBBON FEED SHAFT (21) SAFELY PAST CENTER POINT OF RIBBON FEED DETENT PAWL (23).

ADJ. FORM RIBBON REVERSING CAM ARMS (44) TO THE RIGHT OR LEFT.

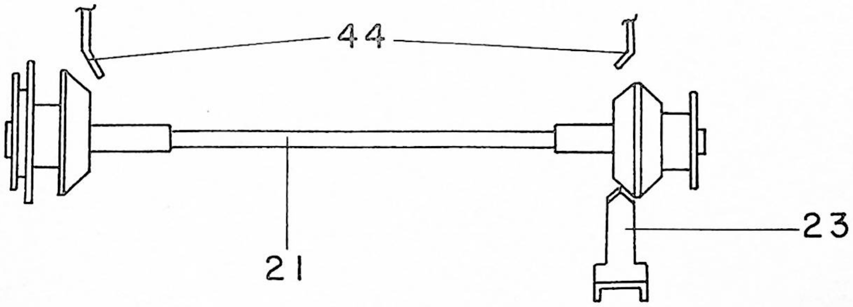


FIG. 10

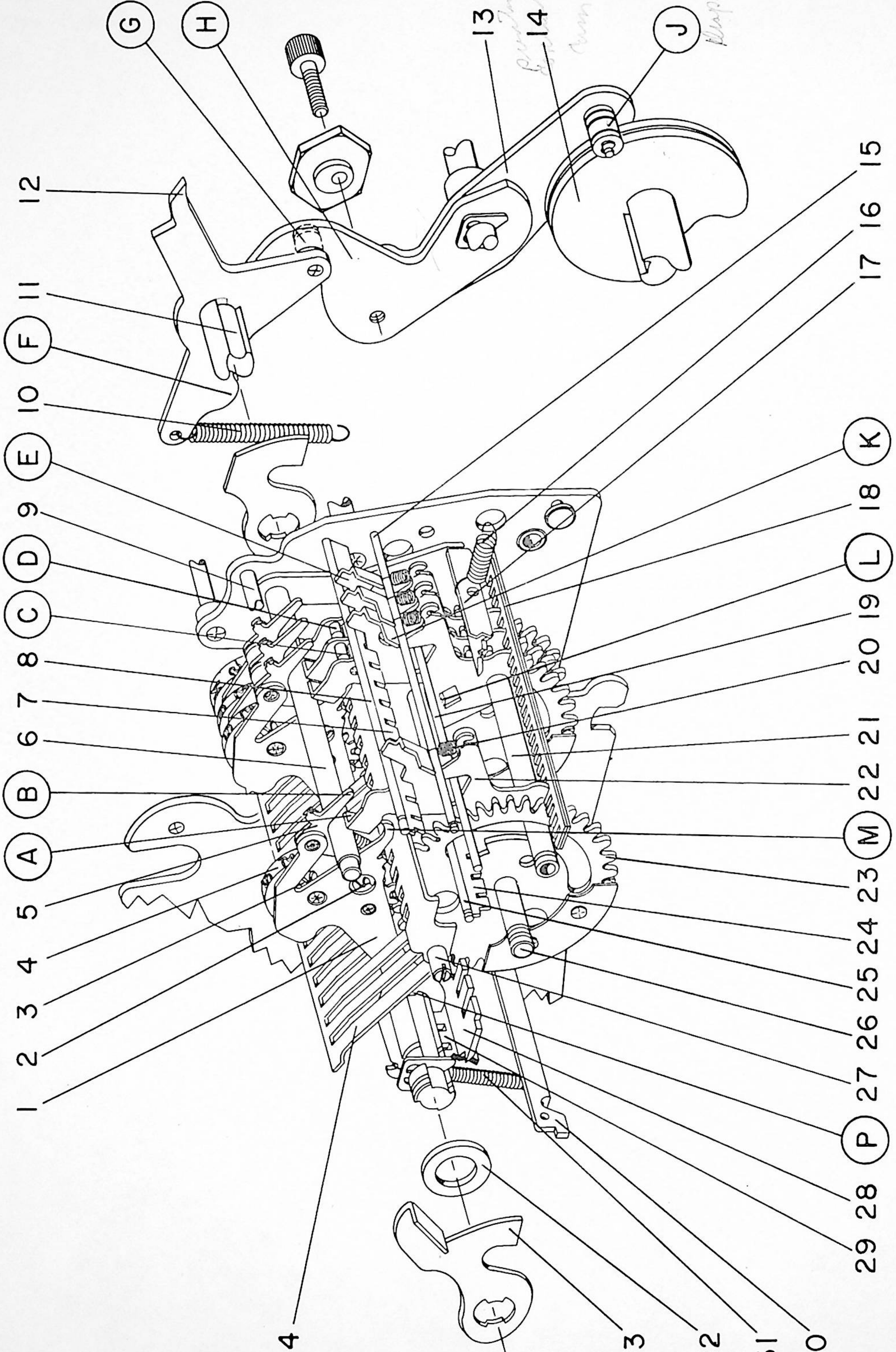


PLATE 13 PRINTING MECHANISM

PRINTING MECHANISM

EACH PRINTING ORDER CONTAINS THE FOLLOWING PARTS: CAM GEAR (23) (PLATE 13); PRINTING LEVER (1) AND PRINTING LEVER RELEASE LATCH (22). EACH PRINTING LEVER (1) IS COMPOSED OF A PRINTING DIAL (4) WITH A SEMI-PIERCED GEAR (3), A SPRING ACTUATED DIAL DETENT DOG (5) AND INTERMEDIATE GEAR (2) FOR ROTATING THE DIAL.

THE CAM GEARS (23) (FIGURE 11) ARE CONSTANTLY MESHED WITH OFFSET RACKS (35) AND CONVERT HORIZONTAL MOTION OF OFFSET RACKS TO ROTARY MOTION IN PRINTING DIAL (4) THRU INTERMEDIATE GEARS (2) DURING MACHINE CYCLE.

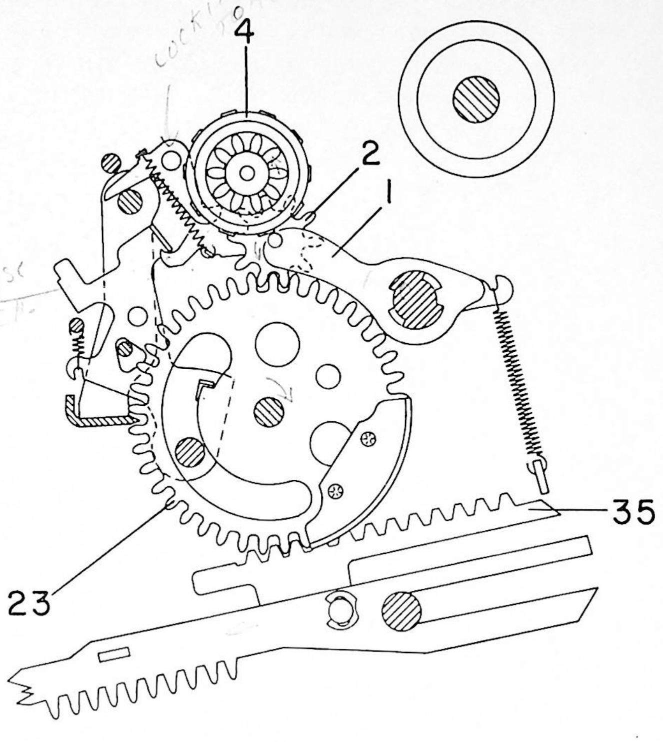


FIG. 11

MACHINE NORMAL, PRINTING LEVERS (1) (PLATE 13) WILL BE HELD FORWARD BY PRINTER CONTROL SHAFT (11) MESHING INTERMEDIATE GEARS WITH CAM GEARS (23). EXTENSION (B) OF DIAL DETENT DOG (5) WILL BE LIMITING ON CAM GEAR LINER PIVOT SHAFT (6), DISENGAGING DOG FROM SEMI-PIERCED GEAR (3) ON DIAL (4). PRINTING LEVER RELEASE LATCHES (22) WILL BE LIMITING ON RELEASE LATCH COMB BAR (8) WITH EARS (A) OVERLATCHING EXTENSIONS (M) ON PRINTING LEVERS (1). ALSO, CAM GEAR LINER (17) WILL BE MESHED WITH CAM GEARS (23).

AT START OF MAIN CONTROL SHAFT CYCLE, MAIN RACK LOCK CONTROL RETURN CAM (38) (FIG. 12) WILL CONTACT FRONT OUTER ROLL (R) ON MAIN RACK LOCK CAM FOLLOWER (37), ROTATING SAME CLOCKWISE, MOVING MAIN RACK CAM FOLLOWER LINK (36) REARWARD. STUD (S) ON LINK (36) ENGAGED WITH FORK IN CAM GEAR LINER BAIL (25) ROTATES BAIL (25) COUNTERCLOCKWISE, RELEASING EXTENSION (T) FROM RELEASE LATCH ACTUATING SHAFT (19). THRU TENSION OF SPRINGS (16), CAM GEAR LINER (17) WILL BE PULLED FORWARD, DISENGAGING FROM CAM GEARS (23).

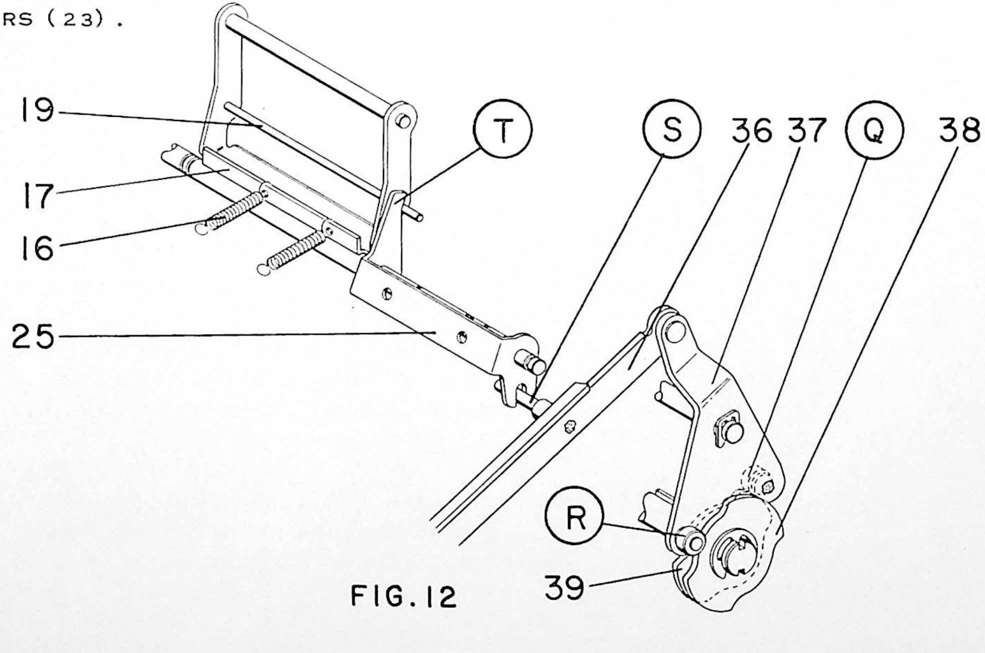


FIG. 12

AT THE SAME TIME, RELEASE LATCH ACTUATING SHAFT (19) (PLATE 13) WILL ACTUATE RELEASE LATCHES (22) FORWARD, PERMITTING EARS (A) TO CLEAR EXTENSIONS (M) OF PRINTING LEVERS AND FOR LOWER EARS (L) TO CLEAR HIGH SURFACE OF CAM GEAR SLOTS. AS CONTROL SHAFT CONTINUES TO ROTATE, MAIN RACKS WILL BE DRIVEN FORWARD AND, THRU OFFSET RACKS (35) (FIGURE 11), CAM GEARS (23) WILL BE ROTATED CLOCKWISE. THIS, IN TURN, THRU INTERMEDIATE GEARS (2) MESHED BETWEEN CAM GEARS (23) AND SEMI-PIERCED GEARS (3), WILL ROTATE PRINTING DIALS (4) CLOCKWISE SAME NUMBER OF SPACES AS WAS ENTERED ON KEYBOARD. JUST BEFORE PRINTING LEVERS ARE RELEASED TO PRINT, MAIN RACK LOCK CONTROL DRIVE CAM (39) (FIGURE 12) WILL CONTACT REAR INSIDE ROLL (Q) ON MAIN RACK LOCK CONTROL CAM FOLLOWER (37), ROTATING SAME COUNTER-CLOCKWISE, MOVING MAIN RACK LOCK CONTROL CAM FOLLOWER LINK (36) FORWARD. STUD (S) ON LINK (36) ENGAGED WITH FORK IN CAM GEAR LINER BAIL (25) ROTATES BAIL (25) CLOCKWISE. EXTENSION (T) CONTACTS RELEASE LATCH ACTUATING SHAFT (19), DRIVING CAM GEAR LINER (17) IN MESH WITH CAM GEARS (23) (PLATE 13). AT THE SAME TIME, SHAFT (19) WILL RELEASE PRINTING LEVER RELEASE LATCHES (22) AND, THRU SPRINGS (20), ALLOWS LOWER EAR (L) TO MOVE TO LOW DWELL OF CAM GEAR SLOT IN COLUMNS TO LEFT OF LISTED FIGURE, PERMITTING UPPER EAR (A) TO LATCH OVER EXTENSION (M) OF PRINTING LEVER (1), PREVENTING PRINTING IN THESE COLUMNS. IN COLUMNS WITH LISTED FIGURES, CAM GEARS WILL BE OUT OF NORMAL; THEREFORE, LOWER EAR (L) WILL LIMIT ON HIGH SURFACE OF CAM GEAR SLOT, HOLDING RELEASE LATCHES FORWARD, PREVENTING UPPER EARS (A) FROM BLOCKING EXTENSIONS (M), ALLOWING LEVERS TO MOVE TO REAR TO PRINT.

AT APPROXIMATELY HALF-CYCLE, ROLL (J) ON PRINTER CONTROL CAM FOLLOWER (13) MOVES INTO DWELL OF PRINTER CONTROL CAM (14), CAUSING UPPER EXTENSION (H) TO RELEASE FROM ROLL (G) ON RIGHT ARM (12) OF PRINTER CONTROL SHAFT (11). THIS WILL PERMIT SHAFT TO ROTATE THRU SPRING (10) UNTIL LOBE (F) RESTS AGAINST PRINTER SHAFT STOP BRACKET. WORKING SURFACES OF SPLINES ON SHAFT MOVE AWAY FROM EXTENSIONS (P) ON PRINTING LEVERS (1), ALLOWING LEVERS TO MOVE REARWARD THRU SPRINGS (31) EXCEPT THOSE THAT ARE BLOCKED BY RELEASE LATCHES (22).

AS PRINTING LEVERS (1) ARE RELEASED TO PRINT, TIPS OF DIAL DETENT DOGS (5) ENTER BETWEEN TEETH OF SEMI-PIERCED GEARS (3) ON DIALS, LOCKING DIALS IN POSITION, SO WHEN INTERMEDIATE GEARS COME OUT OF MESH WITH CAM GEARS (23), DIALS WILL NOT ROTATE. THIS WILL PREVENT DIALS AND INTERMEDIATE GEARS (2) FROM GETTING OUT OF TIME WITH CAM GEARS (23).

AT START OF LAST HALF OF CYCLE, AS MAIN CONTROL SHAFT CONTINUES TO ROTATE, HIGH CONTOUR OF PRINTER CONTROL CAM (14) CONTACTS ROLL (J) ON PRINTER CONTROL CAM FOLLOWER (13). UPPER EXTENSION (H) OF CAM FOLLOWER (13) WILL CONTACT ROLL (G) ON RIGHT ARM (12) OF PRINTER CONTROL SHAFT (11), ROTATING SHAFT COUNTER-CLOCKWISE. WORKING SURFACE OF SPLINE ON SHAFT WILL CONTACT EXTENSIONS (P) OF PRINTING LEVERS (1), RESTORING LEVERS TO NORMAL, RE-MESHING INTERMEDIATE GEARS (2) WITH CAM GEARS (23). ALSO, EXTENSIONS (B) OF DIAL DETENT DOGS WILL BE PRESSED AGAINST CAM GEAR LINER PIVOT SHAFT (6) TO DISENGAGE DOGS FROM SEMI-PIERCED GEAR (3) ON DIAL (4).

AS MAIN CONTROL SHAFT CONTINUES TO RESTORE, MAIN RACK LOCK CONTROL RETURN CAM (38) (FIG. 12) AGAIN WILL CONTACT FRONT OUTER ROLL (R) ON MAIN RACK LOCK CONTROL CAM FOLLOWER (37), ROTATING IT CLOCKWISE WHICH PULLS MAIN RACK LOCK CONTROL CAM FOLLOWER LINK (36) REARWARD. THRU STUD (S) ON LINK (36), CAM GEAR LINER BAIL (25) WILL BE ROTATED COUNTER-CLOCKWISE, RELEASING EXTENSION (T) FROM RELEASE LATCH ACTUATING SHAFT (19). THIS WILL ALLOW SPRINGS (16) TO DISENGAGE CAM GEAR LINER (17) FROM CAM GEAR GEARS (23) (PLATE 13) AND, THRU RELEASE LATCH ACTUATING SHAFT (19), RELEASE LATCHES (22) WILL BE ACTUATED.

AT THIS TIME, MAIN RACKS WILL BE DRIVEN REARWARD TO NORMAL AND, THRU OFFSET RACKS (35) (FIGURE 11), CAM GEARS (23) WILL BE TURNED COUNTER-CLOCKWISE AND, THRU INTERMEDIATE GEAR (2) MESHED BETWEEN CAM GEAR AND SEMI-PIERCED GEAR (3), PRINTING DIAL (4) WILL BE ROTATED COUNTER-CLOCKWISE TO NORMAL POSITION.

AT THE END OF CYCLE, CAM GEAR LINER (17)(PLATE 13) WILL BE DRIVEN INTO MESH WITH CAM GEARS (23) AND RELEASE LATCHES (22) WILL BE LATCHED OVER EXTENSIONS (M) OF PRINTING LEVERS (1). THIS IS ACCOMPLISHED THRU MAIN RACK CONTROL DRIVE CAM (39) (FIGURE 12), CAM FOLLOWER (37), CAM FOLLOWER LINK (36) AND CAM GEAR LINER BAIL (25).

PRINTING LEVER RELEASE LATCHES (22)(PLATE 13) HAVE TRANSFER EARS (K) WITH THE EXCEPTION OF SYMBOL PRINTING LEVER RELEASE LATCH (22) WHICH HAS BEEN CUT OFF. THESE EARS EXTEND UNDER ADJACENT RELEASE LATCH (22) TO THE LEFT. THE PURPOSE OF THESE TRANSFER EARS IS TO PERMIT CIPHERS TO BE PRINTED TO RIGHT OF AN ITEM.

FOR INSTANCE, IF WE ENTER 5.00 IN MACHINE, THIRD ORDER CAM GEAR (23)(FOR THE 5) WOULD ROTATE CLOCKWISE AND CAM GEAR IN SECOND AND FIRST ORDER (FOR THE TWO CIPHERS) WOULD REMAIN IN ZERO OR NORMAL POSITION. AT THE PROPER TIME DURING CYCLE, WHEN CAM GEAR LINER (17) MOVES INTO MESH WITH CAM GEARS (23), RELEASE LATCHES (22) MOVE TO REAR WITH EAR (L) ON RELEASE LATCH FOR THIRD ORDER LIMITING ON HIGH SURFACE OF CAM GEAR SLOT, PREVENTING EAR (A) ON THIS LATCH FROM BLOCKING EXTENSION (M) ON ITS RESPECTIVE PRINTING LEVER (1). TRANSFER EAR (K) ON RELEASE LATCH FOR SECOND ORDER WILL LIMIT ON THIRD ORDER RELEASE LATCH AND, IN TURN, LIMITS FIRST ORDER RELEASE LATCH; THEREFORE, BOTH LATCHES WILL BE HELD FORWARD, PREVENTING THEM FROM BLOCKING THEIR RESPECTIVE PRINTING LEVERS, PERMITTING 5.00 TO BE PRINTED ON TAPE.

CAM GEARS (23) TO LEFT OF THIRD ORDER HAVE NOT ROTATED FROM CIPHER POSITION SO THE RESPECTIVE RELEASE LATCHES WILL TRAVEL REARWARD UNTIL EARS (L) ENTER LOW DWELL OF CAM SLOT, POSITIONING RELEASE LATCH EARS (A) OVER EXTENSIONS (M) ON PRINTING LEVERS (1). THIS WILL PREVENT PRINTING IN THESE COLUMNS.

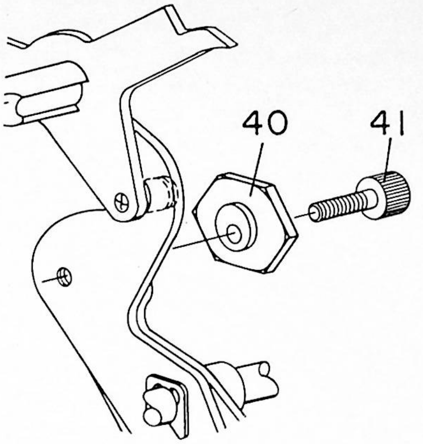
INTERLOCKING STUD (C) ON UNITS COLUMN RELEASE LATCH (22) WILL BLOCK TENS COLUMN RELEASE LATCH (22) WHEN UNITS CAM GEAR (23) IS OUT OF NORMAL OR ZERO POSITION. THIS WILL ALLOW ZERO TO PRINT IN TENS COLUMN WHEN ENTERING AMOUNTS IN UNITS COLUMN ONLY. FOR EXAMPLE, WHEN ONE CENT IS LISTED, .01 WILL BE PRINTED ON TAPE.

INTERLOCKING STUD (D) ON SYMBOL COLUMN RELEASE LATCH (22) WILL BLOCK UNITS COLUMN RELEASE LATCH (22) WHICH, IN TURN, THRU ITS STUDS WILL BLOCK TENS COLUMN RELEASE LATCH. THIS WILL OCCUR WHEN SYMBOL CAM GEAR (23) IS OUT OF NORMAL POSITION WHICH WILL PERMIT ZEROS TO PRINT IN UNITS AND TENS COLUMN WHEN ANY SYMBOL IS SELECTED WITH NO AMOUNT KEYS DEPRESSED, (I.E., CONSECUTIVE TOTALS). THIS WILL INSURE THE OPERATOR THAT MACHINE IS CLEAR.

TEST

1. MACHINE NORMAL, INTERMEDIATE GEARS (2) (FIGURE 13) ON PRINTING LEVERS (1) SHOULD BE FREE AND MESH WITH CAM GEARS (23) WITH .004" TO .006" MOVEMENT. MAKE THIS CHECK WITH TIGHTEST PRINTING LEVER.

   ADJ. LOOSEN ALLEN SCREW (37) AND MOVE PRINTER OPERATING ARM ECCENTRIC (40) TO A DIFFERENT POSITION.



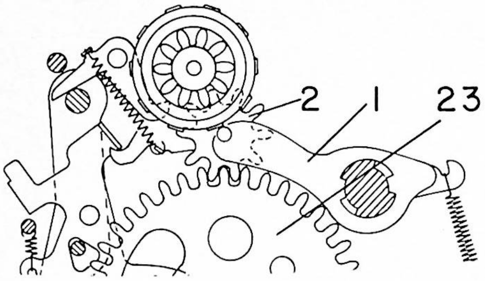


FIG. 13

2. PRINTED FIGURES SHOULD BE SAME DENSITY ON TOP AND BOTTOM AND LINE OF PRINT SHOULD NOT VARY BY MORE THAN .010" FROM STRAIGHT LINE.

   ADJ. FORM EXTENSION (N) (FIGURE 14) OF PRINTING LEVERS (1) TO REPOSITION DIAL LOCK PAWL (5) WITH SEMI-PIERCED GEAR ON DIAL. EXAMPLE: IF PRINTING WERE LIGHT ON THE BOTTOM, FORM EXTENSION (N) DOWN WHICH WILL ROLL DIAL UPWARD; LIKEWISE, IF PRINTING WERE LIGHT ON THE TOP, FORM EXTENSION (N) UP.

spring printing
high

3. PRINTED FIGURES SHOULD PRINT SQUARELY ON PLATEN.

   ADJ. TWIST PRINTING LEVERS (1) (FIGURE 14) JUST ABOVE PRINTING LEVER GUIDE COMB (34).

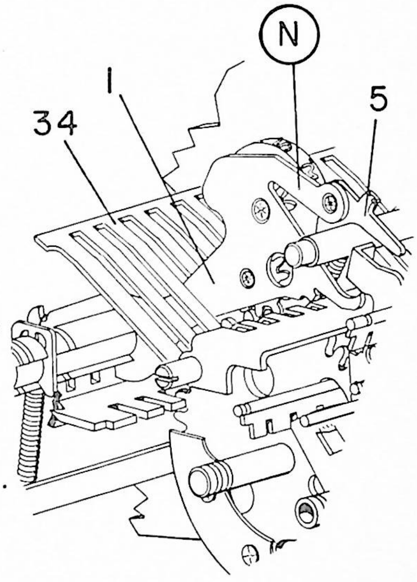


FIG. 14

4. PRINTED FIGURES SHOULD BE SAME DENSITY WITH EITHER LARGE OR SMALL AMOUNTS. DEPRESS FULL ROW OF AMOUNT KEYS AND CYCLE MACHINE THRU UNTIL PRINTING TAKES PLACE. WITH LOBE (F) (FIGURE 15) OF RIGHT ARM (12) OF PRINTER CONTROL SHAFT (11) LIMITING ON DOWNSTOP (R), EACH PRINTING LEVER SHOULD BE FREE TO MOVE INTO FULL ENGAGEMENT WITH CAM GEARS WITHOUT MOVING SHAFT (11). ALSO, WITH PRINTING LEVER TOUCHING PLATEN, RIGHT ARM (12) SHOULD CLEAR DOWNSTOP (R) BY .030" BEFORE PICKING UP LEVERS.

   ADJ. FORM EXTENSION OF DOWNSTOP (R) UP OR DOWN.

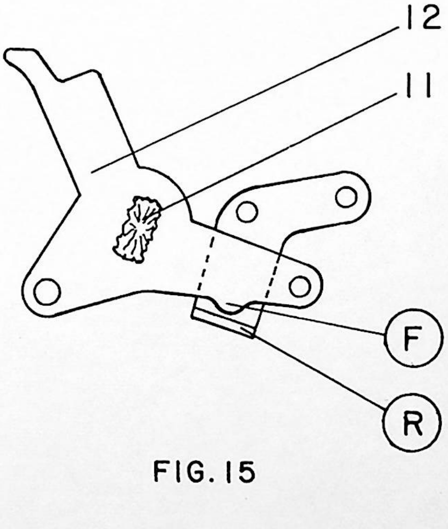


FIG. 15

5. MACHINE NORMAL, PRINTING LEVER RELEASE LATCHES (22) (FIGURE 16) SHOULD LINE UP LATERALLY TO PROPERLY ENGAGE EXTENSIONS (M) OF PRINTING LEVERS (1).

ADJ. FORM EXTENSIONS (M) OF PRINTING LEVERS (1) OR UPPER EXTENSIONS OF RELEASE LATCHES (22).

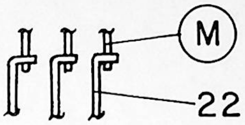


FIG. 16

6. WITH NUMBER ONE AMOUNT KEY ON EXTREME LEFT DEPRESSED, CYCLE MACHINE THRU UNTIL PRINTING LEVERS (1) ARE RELEASED. CHECK FOR AT LEAST .030" CLEARANCE BETWEEN EARS (A) (FIGURE 17) ON RELEASE LATCHES (22) AND EXTENSIONS (M) OF PRINTING LEVERS (1). CHECK CLEARANCE BY PULLING EACH PRINTING LEVER FORWARD MANUALLY.

ADJ. FORM TRANSFER EARS (K) ON RELEASE LATCHES (22).

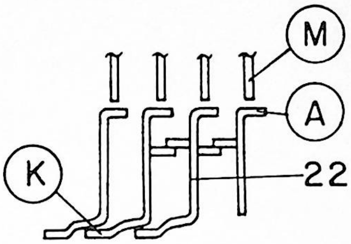


FIG. 17

7. MACHINE NORMAL, PRINTER CAM GEAR LINER (17) (FIGURE 18) SHOULD BE SQUARE AND BOTTOM SLIGHTLY BETWEEN TEETH ON CAM GEARS.

ADJ. FORM CAM GEAR LINER (17) FOR SQUARENESS AND TORQUE CAM GEAR LINER BAIL (25) FOR BOTTOMING LINER (17) IN TEETH OF CAM GEAR.

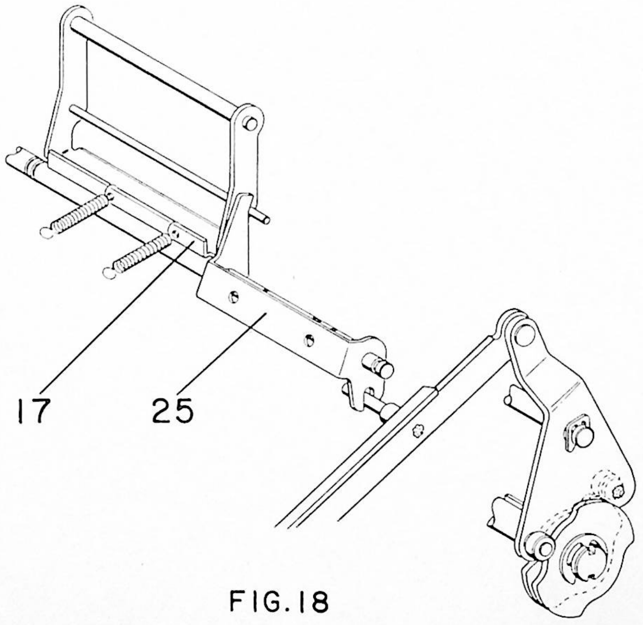
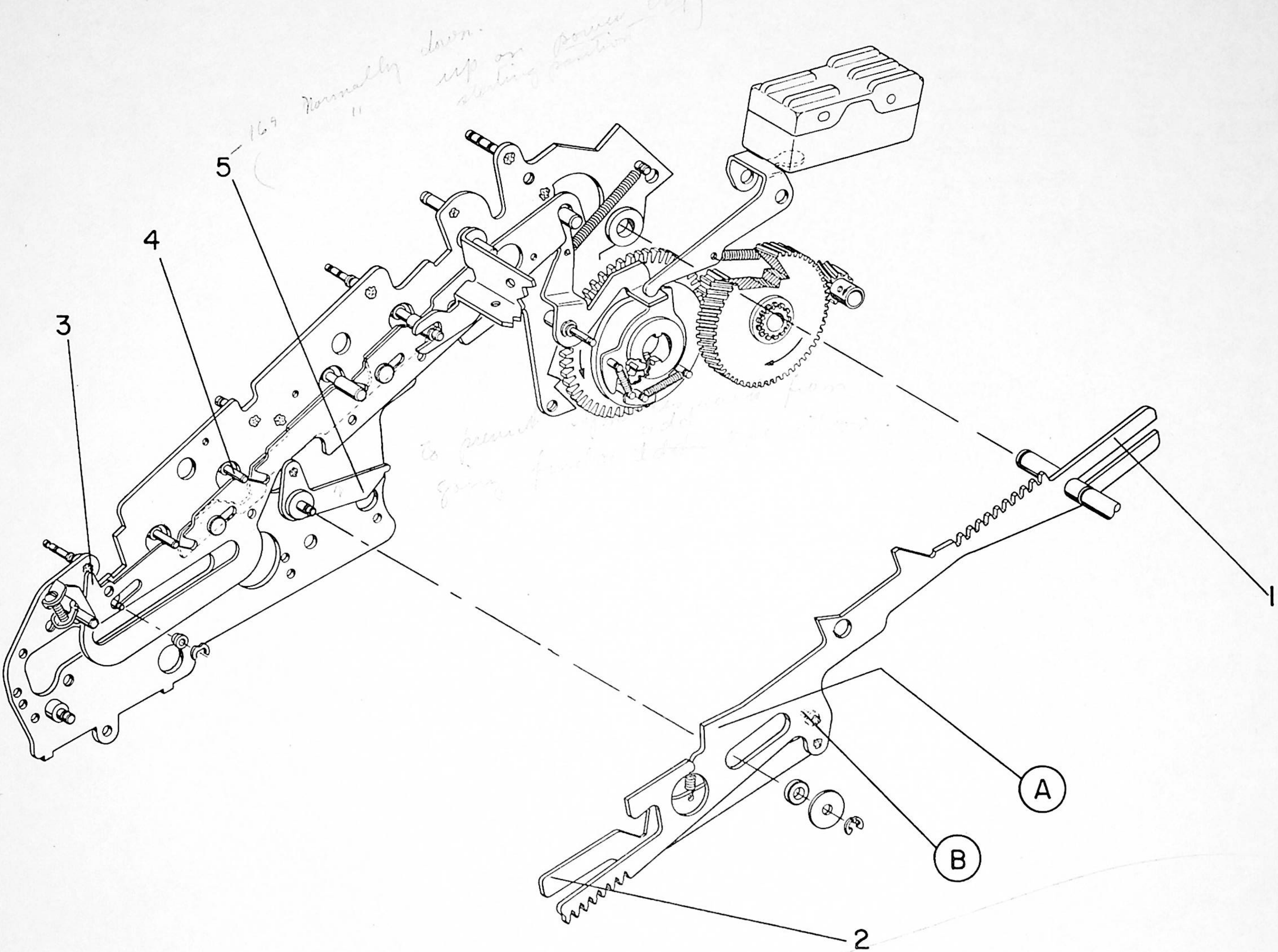


FIG. 18



164 Normally down.
" up on power trip)
starting position

to prevent [illegible] from
going further [illegible]

PLATE 14 SYMBOL CONTROL

SYMBOL CONTROL RACK

THE PURPOSE OF SYMBOL CONTROL RACK (1) (PLATE 14) IS TO PERMIT CORRECT SYMBOL TO BE PRINTED BY SYMBOL PRINTING DIAL ON VARIOUS MACHINE OPERATIONS; THEREFORE, IDENTIFYING THE MACHINE OPERATION.

SYMBOL CONTROL RACK (1) IS FIRST RACK ON LEFT SIDE OF MACHINE JUST TO THE RIGHT OF CLUTCH CONTROL BAR (3).

MACHINE NORMAL, SYMBOL STOP BELLCRANK (5) WILL BE IN A DOWN POSITION IN PATH OF STUD (B) ON SYMBOL RACK (1). THIS WILL BLOCK SYMBOL CONTROL RACK FROM MOVING FORWARD ON DEPRESSION OF REPEAT OR ADD KEYS TO PREVENT ANY SYMBOL FROM PRINTING ON THESE OPERATIONS.

DEPRESSION OF SUBTRACT, NON-ADD, SUB-TOTAL OR TOTAL KEYS CAUSES ITS RESPECTIVE BELLCRANK TO ROTATE WITH INNER STUD (4) ON BELLCRANK ENTERING SLOT IN CLUTCH CONTROL BAR (3).

THIS POSITIONS INNER STUD (4) IN PATH OF RESPECTIVE STEP (A) ON SYMBOL CONTROL RACK (1) TO BLOCK RACK WHEN IT IS DRIVEN FORWARD ON FIRST HALF OF MACHINE CYCLE. OUTER STUD (7) (FIGURE 19) ON RESPECTIVE BELLCRANK WILL CAM ACCUMULATOR POSITIONING CAM BAR (6) FORWARD AND, THRU SLOT ENGAGED WITH STUD (8) ON SYMBOL STOP BELLCRANK (5) (PLATE 14), ROTATES BELLCRANK (5) UP OUT OF THE PATH OF STUD (B) ON SYMBOL CONTROL RACK (1).

ON FIRST HALF OF MAIN CONTROL SHAFT CYCLE, SYMBOL CONTROL RACK (1) MOVES FORWARD UNTIL RESPECTIVE STEP (A) ON SYMBOL CONTROL RACK LIMITS ON INNER STUD (4) OF BELLCRANK. AT THIS TIME, SYMBOL RACK CONTROL ARM (2) WILL YIELD. AS SYMBOL CONTROL RACK MOVES FORWARD, SYMBOL CONTROL SHAFT (32) (PLATE 12) WILL BE ROTATED CLOCKWISE AND SYMBOL GEAR SHAFT (29) COUNTER-CLOCKWISE. GEAR (27) ON RIGHT END OF SHAFT MESHED WITH SYMBOL CAM GEAR ROTATES CAM GEAR AND, THRU INTERMEDIATE GEAR ON SYMBOL PRINTING LEVER ROTATES SYMBOL DIAL TO PROPER SYMBOL.

ON LAST HALF OF CYCLE, SYMBOL CONTROL RACK (1) (PLATE 14), SYMBOL GEAR SHAFT (29) (PLATE 12), SYMBOL CONTROL SHAFT (32) AND SYMBOL DIAL WILL BE RESTORED TO NORMAL.

AT THE END OF CYCLE, CLUTCH CONTROL BAR (3) (PLATE 14), KEY ACTUATED BELLCRANK, ACCUMULATOR POSITIONING CAM BAR (6) (FIGURE 19) AND SYMBOL STOP BELLCRANK (5) (PLATE 14) WILL RESTORE. SYMBOL STOP BELLCRANK WILL BE POSITIONED BACK IN THE PATH OF STUD (B) ON SYMBOL CONTROL RACK (1).

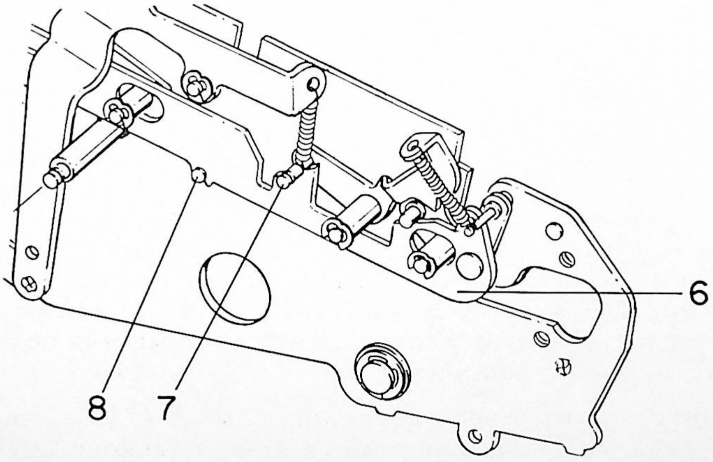


FIG. 19

REMOVAL OF PRINTER

DEPRESS ADD KEY (NO AMOUNT KEYS DEPRESSED) AND HAND CRANK MACHINE THRU UNTIL ROLL (J) (PLATE 13) ON PRINTER CONTROL CAM FOLLOWER (13) ENTERS LOW DWELL OF PRINTER CONTROL CAM (14).

REMOVE PAPER ROLL AND SHAFT (26) (PLATE 10).

REMOVE KEEPER FROM LOWER END OF PLATEN SPACING LINK (10) AND DISCONNECT LINK FROM CAM FOLLOWER (11).

REMOVE REAR LATERAL BRACE (16) BY REMOVING FOUR PINS (13). REMOVE MOTOR COVER (25).

REMOVE KEEPER ON INSIDE LEFT PRINTER SIDE FRAME FOR PLATEN INDEXING BAIL PIVOT SHAFT (16) (PLATE 11). PULL SHAFT TO LEFT TO DISENGAGE IT FROM OFFSET RACK GUIDE COMB (15) (PLATE 10) AND LEFT PRINTER SIDE FRAME.

UNHOOK RIBBON FEED PAWL SPRING (38) (PLATE 12).

REMOVE SCREW (14) (PLATE 10) FROM OUTSIDE RIGHT PRINTER FRAME FOR OFFSET RACK GUIDE COMB (15).

UNHOOK ACCUMULATOR BALANCE SPRING (24) (PLATE 12) FROM RIGHT END OF FRONT PRINTER SUPPORT SHAFT (28).

REMOVE PRINTER CLAMP BARS (30) (FIGURE 20) LEFT AND RIGHT BY REMOVING FOUR SCREWS (31).

UNHOOK CAM GEAR LINER SPRINGS (16) (PLATE 13) FROM KEYBOARD.

PRINTER MAY NOW BE REMOVED EASILY IF INSTRUCTIONS HAVE BEEN FOLLOWED.

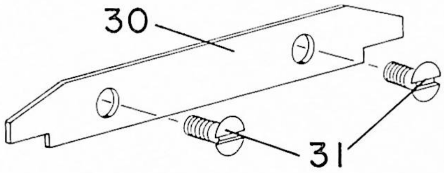


FIG.20

DISASSEMBLY OF PRINTER

REMOVE RIBBON AND RIBBON SPOOLS, RIGHT AND LEFT.

REMOVE RIBBON SPOOL GEAR AND FLANGE ASSEMBLIES (19) (PLATE 12) RIGHT AND LEFT, BY REMOVING KEEPERS. REMOVE SPACERS (15) AND FRICTION SPRINGS (10).

REMOVE NON-REVERSE BACK-UP PAWL (30) BY UNHOOKING SPRING (6) AND REMOVING KEEPER.

REMOVE LEFT RIBBON ARM (1) BY UNHOOKING SPRING (4) AND REMOVING KEEPER.

REMOVE RIGHT RIBBON ARM (9) BY UNHOOKING SPRING (11) AND REMOVING KEEPER.

REMOVE RIGHT AND LEFT RIBBON UPSTOPS (2) BY REMOVING KEEPERS.

UNHOOK SPRING (12) FOR RIGHT RIBBON REVERSE ARM (13) AND REMOVE CAM GEAR LINER BAIL (25) AND SPRING HOOK (26) FROM FRONT PRINTER TIE ROD (28).

REMOVE PLATEN SPACING LINK BLOCK ARM (9) (PLATE 10) BY UNHOOKING SPRING (17) AND REMOVING KEEPER.

UNHOOK SPRING (2) AND REMOVE KEEPER FOR PLATEN CENTRALIZING ARM (3) AND REMOVE ARM.

UNHOOK SPRING (18) FROM PLATEN INDEXING CONTROL LEVER (7) AND REMOVE LEVER AND PLATEN SPACING LINK (10). REMOVE TRIPLE SPACE CONTROL LEVER (27) BY REMOVING KEEPER. NOTE: DO NOT LOSE FRICTION SPRING. REMOVE RIBBON FEED DETENT PAWL (23) (PLATE 12) BY UNHOOKING SPRING (22) AND REMOVING KEEPER. REMOVE SPRING HOOK (17). REMOVE RIBBON FEED SHAFT (21). THIS IS ACCOMPLISHED BY REMOVING COTTER KEY IN RIBBON GEAR HUB (31) AND PULLING SHAFT TO RIGHT.

UNHOOK SPRING (40) FOR LEFT RIBBON REVERSING CAM ARM (44). DISENGAGE EAR (E) FROM SLOT IN REVERSING CAM ARM (44) AND REMOVE RIBBON REVERSE LEVER (5).

REMOVE RIBBON REVERSING CAM ARM (44) BY REMOVING KEEPER.

REMOVE RIGHT RIBBON REVERSING CAM ARM AND RIGHT RIBBON REVERSE LEVER IN THE SAME MANNER AS LEFT SIDE.

REMOVE PAPER TEAR-OFF BAR (4) (PLATE 10) BY REMOVING TWO SCREWS (8) AND RAISING BAR UP AND TOWARD FRONT TO DISENGAGE IT FROM STUDS IN PRINTER FRAMES.

REMOVE PLATEN (1) FROM SLOTS IN PRINTER FRAMES.

REMOVE STATIONARY PAPER GUIDE (5) BY RAISING IT UP AND TO THE FRONT.

REMOVE PAPER FEED-IN GUIDE SUPPORT SHAFT (29) BY REMOVING KEEPER ON RIGHT END.

REMOVE PAPER FEED-IN GUIDE (28) BY SLIGHTLY SPRINGING PRINTER FRAMES TO DISENGAGE EARS OF GUIDE FROM FRAMES.

REMOVE PLATEN PRESSURE ROLL SUPPORT PLATE (21), FRONT PRESSURE ROLL (24), REAR PRESSURE ROLL (23) AND HOOK (22) AS AN ASSEMBLY BY REMOVING SUPPORT SHAFT (20) TO RIGHT.

UNHOOK SPRING (10) FOR PRINTER CONTROL SHAFT (11) (PLATE 13).

REMOVE LEFT RIBBON REVERSING ARM (33) AND SPACER (32) BY REMOVING KEEPER FROM LEFT END OF PRINTER CONTROL SHAFT (11).

REMOVE TWO KEEPERS FROM LEFT END OF PRINTER CONTROL SHAFT (11). (ONE ON THE OUTSIDE OF FRAME AND ONE ON THE INSIDE OF FRAME)

REMOVE PRINTER CONTROL SHAFT (11) BY PULLING SHAFT TO RIGHT.

UNHOOK PRINTING LEVER SPRINGS (31) FROM PRINTING LEVERS (1). REMOVE SPRING BAR (30).

REMOVE PRINTING LEVERS (1).

REMOVE CAM GEAR AND PRINTING LEVER GUIDE COMB (34) BY REMOVING TWO SCREWS (27). UNHOOK RELEASE LATCH SPRINGS (20) FROM LATCHES (22). REMOVE KEEPER FROM PRINTING LEVER RELEASE LATCH SPRING SHAFT (15) AND REMOVE SHAFT (15) AND SPRINGS (20).

REMOVE RELEASE LATCH GUIDE COMB BAR, UPPER (8) BY REMOVING KEEPERS. REMOVE RELEASE LATCH GUIDE COMB (7).

REMOVE RELEASE LATCH ACTUATING SHAFT (19) BY REMOVING KEEPER.

REMOVE DIAL LOCK DOG SAFETY SHAFT (9) BY REMOVING KEEPER FROM ONE END OF SHAFT.

REMOVE CAM GEAR LINER (17) BY SPRINGING PRINTER FRAMES SLIGHTLY.

REMOVE RELEASE LATCH GUIDE COMB BAR (25) AND RELEASE LATCH GUIDE COMB (24) BY REMOVING KEEPER FROM LEFT END OF SHAFT (25). THESE PARTS GO THRU SLOTS IN CAM GEARS (23).

REMOVE TWO KEEPERS FROM EACH END OF RELEASE LATCH PIVOT SHAFT (21). THESE KEEPERS ARE LOCATED INSIDE PRINTER FRAMES.

REMOVE RELEASE LATCH PIVOT SHAFT (21) TO RIGHT AND REMOVE RELEASE LATCHES (22), KEEPING THEM IN SAME ORDER AS THEY WERE ASSEMBLED IN MACHINE.

REMOVE KEEPER ON INSIDE RIGHT PRINTER FRAME FOR CAM GEAR PIVOT SHAFT (26).

REMOVE CAM GEAR PIVOT SHAFT (26) TO RIGHT AND REMOVE CAM GEARS (23), KEEPING THEM IN SAME ORDER AS THEY WERE ASSEMBLED IN MACHINE.

REMOVE FRONT PRINTER SUPPORT SHAFT (28) (PLATE 12) BY REMOVING THREE KEEPERS FROM LEFT END.

REMOVE CAM GEAR AND RELEASE LATCH GUIDE COMBS (18) (PLATE 13).

REMOVE SYMBOL GEAR CONTROL SHAFT (29)(PLATE 12). TO DO THIS, REMOVE PIN IN GEAR (27) AND KEEPER ON SHAFT INSIDE OUTBOARD BEARING PLATE (33).

REMOVE SYMBOL GEAR SHAFT (32) BY REMOVING KEEPER ON INSIDE OUTBOARD BEARING PLATE (33).

REMOVE OUTBOARD BEARING SUPPORT COMB (36) AND SHAFT (37) BY REMOVING KEEPER ON INSIDE BEARING PLATE (33). ALSO, REMOVE RIBBON FEED PAWL SPRING (38).

REMOVE OUTBOARD BEARING PLATE (33) BY REMOVING KEEPER ON REAR PRINTER SUPPORT SHAFT (42).

REMOVE REAR PRINTER SUPPORT SHAFT (42) BY REMOVING KEEPER ON INSIDE LEFT PRINTER FRAME.

REMOVE PRINTING LEVER GUIDE COMB (29)(PLATE 13) AND CAM GEAR GUIDE COMB (28).

REASSEMBLY OF PRINTER

REPLACE CAM GEAR GUIDE COMB (28) IN LEFT PRINTER FRAME WITH SLOTS TO THE FRONT AND WIDE END TO THE RIGHT. PLACE RIGHT PRINTER FRAME IN POSITION OVER COMB (28). REPLACE PRINTING LEVER GUIDE COMB (29) THRU RIGHT AND LEFT PRINTER FRAMES WITH SLOTS TO TOP AND WIDE END TO RIGHT. PLACE SLOTS ON EACH END OF COMB IN SLOTS IN FRAMES.

REPLACE REAR PRINTER SUPPORT SHAFT (42)(PLATE 12) AND REPLACE KEEPER INSIDE LEFT PRINTER FRAME.

REPLACE OUTBOARD BEARING PLATE (33) ON REAR PRINTER SUPPORT SHAFT (42) WITH KEEPER.

REPLACE OUTBOARD BEARING PLATE COMB (36) WITH SLOTS IN COMB UP AND SLOTS IN EACH END ENGAGED WITH LEFT PRINTER FRAME AND PLATE (33). REPLACE SHAFT (37) WITH KEEPER. REHOOK RIBBON FEED PAWL SPRING (38) ON SHAFT.

REPLACE SYMBOL CONTROL GEAR SHAFT (29) WITH GEAR (27) BETWEEN FRAMES. REPLACE PIN IN GEAR (27).

REPLACE CAM GEAR AND RELEASE LATCH GUIDE COMBS (18)(PLATE 13) WITH SLOTS TO REAR AND WIDE END TO RIGHT.
REPLACE FRONT PRINTER SUPPORT SHAFT (28)(PLATE 12) WITH THREE KEEPERS.

REPLACE CAM GEARS (23)(PLATE 13). START WITH SYMBOL CAM GEAR (WHICH IS THE ONE WITH NO FLANGE) IN SECOND SLOT IN GUIDE COMBS (18); AND, WITH WIDE PORTION OF CAM GEAR SLOT UP AND TO THE REAR, INSERT SHAFT (26) THRU CAM GEARS AS THEY ARE INSTALLED. REPLACE KEEPER ON CAM GEAR PIVOT SHAFT (26) ON INSIDE RIGHT PRINTER FRAME.

REPLACE PRINTING HAMMER RELEASE LATCHES (22) WITH RELEASE LATCH PIVOT SHAFT (21). MAKE SURE SHAFT GOES THRU SLOT IN CAM GEARS (23). REPLACE TWO KEEPERS ON SHAFT INSIDE PRINTER FRAMES. CHECK RELEASE LATCHES FOR BEING IN SLOTS IN GUIDE COMBS (18).

REPLACE RELEASE LATCH GUIDE COMB (24) AND SHAFT (25) WITH WIDE END OF COMB TO RIGHT. THESE PARTS GO THRU SLOT IN CAM GEARS (23). REPLACE KEEPER ON LEFT END OF SHAFT (25).

REPLACE CAM GEAR LINER (17), PLACING RELEASE LATCHES ABOVE LINER AND IN SLOTS OF GUIDE COMB (24).

REPLACE RELEASE LATCH ACTUATING SHAFT (19) THRU HOLE IN RIGHT SIDE OF LINER (17) AND THRU TRIANGULAR HOLES IN RELEASE LATCHES (22) AND IN HOLE IN LEFT SIDE OF LINER. REPLACE KEEPER ON SHAFT.

REPLACE DIAL LOCK PAWL SAFETY SHAFT (9) WITH KEEPER.

REPLACE FRONT RELEASE LATCH GUIDE COMB (7) AND SHAFT (8) WITH WIDE END OF COMB TO RIGHT. LINE UP RELEASE LATCHES WITH SLOTS IN COMB AND REPLACE TWO KEEPERS ON SHAFT.

REPLACE RELEASE LATCH SPRING SHAFT (15) AND SPRINGS (20) WITH KEEPER. REHOOK RELEASE LATCH SPRINGS (20).

REPLACE CAM GEAR AND PRINTING LEVER GUIDE COMB (34) WITH TWO SCREWS (27). MAKE SURE REAR END OF COMB DOWNLIMITS ON PRINTER FRAMES.

REPLACE PRINTING LEVERS (1).

REPLACE PRINTING LEVER SPRING BAR (30) IN SLOTS IN FRAMES WITH SPRING HOLES IN BAR TO THE REAR. REHOOK PRINTING LEVER SPRINGS (31).

REPLACE PRINTER CONTROL SHAFT (11) IN FROM RIGHT SIDE THRU PRINTING LEVERS (1). REPLACE KEEPER ON INSIDE AND OUTSIDE LEFT PRINTER FRAME. CHECK PRINTING LEVERS (1) FOR FREE IN GUIDE COMB (34). REHOOK PRINTER CONTROL SHAFT SPRING (10).

REPLACE STATIONARY PAPER GUIDE (5)(PLATE 10), PLACING FORKS OVER STUDS IN FRAMES.

REPLACE PLATEN (1) WITH SLOTS IN BEARINGS PLACED IN OPENINGS IN PRINTER FRAMES.

REPLACE PAPER TEAR-OFF BAR (4) WITH TWO SCREWS (8). AT THIS TIME, ADJUST BAR (4) TO REMOVE UP AND DOWN AND FRONT AND REAR PLAY IN PLATEN (1).

REPLACE PRESSURE ROLL SUPPORT PLATE (21), FRONT PRESSURE ROLL (24) AND REAR PRESSURE ROLL (23). REPLACE MOUNTING SHAFT (20) WITH GROOVE IN SHAFT OVER STUD IN PLATE (21) AND HOOK OF SPRING (22) FOR REAR ROLL AROUND SHAFT (20).

REPLACE PAPER FEED-IN GUIDE (28) WITH EARS OF GUIDE IN PRINTER FRAME. REPLACE PAPER FEED-IN GUIDE SUPPORT SHAFT (29) WITH KEEPER ON RIGHT END OF SHAFT.

REPLACE LEFT RIBBON REVERSING CAM ARM (44)(PLATE 12) ON RIBBON SPOOL AXLE (43) WITH SLOT IN ARM TO REAR.

REPLACE LEFT RIBBON REVERSE LEVER (5)(PLATE 12) ON STUD IN LEFT PRINTER FRAME WITH FORMED EAR (E) ENGAGED WITH SLOT IN RIBBON REVERSING CAM ARM (44). REHOOK RIBBON REVERSING CAM ARM SPRING (40).

REPLACE RIGHT RIBBON REVERSING CAM ARM (44) AND RIBBON REVERSE LEVER (13) IN SAME MANNER AS LEFT ARM AND LEVER.

REPLACE RIBBON FEED SHAFT (21) THRU RELEASE LATCH PIVOT TUBE, PLACING RIBBON RATCHET GEAR HUB (31) ON LEFT END OF SHAFT WITH COTTER KEY.

REPLACE SPACER (32)(PLATE 13), LEFT RIBBON REVERSING CAM ARM (33) AND KEEPER ON LEFT END OF PRINTER CONTROL SHAFT (11).

REPLACE RIGHT AND LEFT RIBBON ARM UP-STOPS (2)(PLATE 12).

REPLACE LEFT RIBBON ARM (1) WITH KEEPER AND REHOOK SPRING (4) BETWEEN ARM AND RIBBON ARM UPSTOP (2).

REPLACE RIGHT RIBBON ARM (9) WITH KEEPER AND REHOOK SPRING (11) BETWEEN ARM AND RIBBON ARM UPSTOP (2).

REPLACE NON-REVERSE DETENT PAWL (30) AND REHOOK SPRING (6) TO RIBBON REVERSE LEVER (5).

REPLACE RIBBON FEED DETENT PAWL (23) WITH KEEPER AND REHOOK SPRING (22) TO HOOK(17).

REPLACE TRIPLE SPACE CONTROL LEVER (27)(PLATE 10) ON STUD AND REPLACE KEEPER. NOTE: BE SURE TO PLACE FRICTION SPRING BETWEEN LEVER (27) AND PRINTER FRAME.

PLACE PLATEN SPACING LINK (10) IN POSITION WITH EAR (A) TO TOP. THEN REPLACE PLATEN INDEXING CONTROL LEVER (7) ON STUD IN FRAME WITH STUD (C) TO FRONT OF PLATEN SPACING LINK (10). REHOOK SPRING (18) TO PLATEN INDEXING CONTROL LEVER (7).

REPLACE PLATEN SPACING LINK BLOCK ARM (9) ON STUD IN FRAME WITH EXTENSION (M) BETWEEN ARM (P) AND PRINTER FRAME. REPLACE KEEPER AND REHOOK SPRING (17).

REPLACE PLATEN CENTRALIZING LEVER (3) WITH ROLL (B) UNDER PLATEN RATCHET (6).

REPLACE KEEPER AND REHOOK SPRING (2).

REPLACE CAM GEAR LINER BAIL (25)(PLATE 12) AND SPRING HOOK (26) ON RIGHT END OF FRONT PRINTER SHAFT (28). REHOOK RIBBON REVERSE LEVER SPRING (12) TO HOOK (26).

REPLACE TENSION WASHERS (16) AND SPACERS (15) ON RIBBON SPOOL AXLES (43) AND REPLACE RIBBON SPOOL GEARS AND FLANGE ASSEMBLIES (19) ON AXLES. REPLACE KEEPERS.

REPLACE RIBBON AND RIBBON SPOOLS.

REPLACING PRINTER ON MACHINE

BEFORE INSTALLING PRINTER ON MACHINE, MAKE SURE CAM GEARS (23) (PLATE 13) ARE IN TIME WITH PRINTING LEVER RELEASE LATCHES (22). TO DETERMINE IF TIMING IS CORRECT, EXTENSIONS (E) ON ALL RELEASE LATCHES SHOULD BE LIMITING ON RELEASE LATCH COMB BAR (8). THIS INDICATES THAT CAM GEARS (23) ARE IN NORMAL OR ZERO POSITION AND EAR (L) ON RELEASE LATCH POSITIONED IN LOW DWELL OF CAM SLOT. TO TIME CAM GEARS WITH RELEASE LATCHES, LAY PRINTER UPSIDE DOWN. WITH PRINTER IN THIS POSITION, ROTATE CAM GEARS (23) TOWARD YOU WHILE HOLDING CAM GEAR LINER (17) DISENGAGED WITH CAM GEARS. AFTER ROTATING GEARS TO ZERO, RE-ENGAGE CAM GEAR LINER (17) WITH GEARS TO HOLD THEM IN ZERO POSITION. ALL EXTENSIONS (E) OF RELEASE LATCHES (22) SHOULD NOW BE LIMITING ON RELEASE LATCH COMB BAR (8).

WHEN INSTALLING PRINTER ON MACHINE, IT WILL BE NECESSARY TO CORRECTLY POSITION THE FOLLOWING:

1. MACHINE IN HALF CYCLE (NO AMOUNT KEYS DEPRESSED).
2. RIBBON FEED PAWL (39) ABOVE RIBBON RATCHET GEAR HUB (31) (PLATE 12).
3. PLACE FORK OF CAM GEAR LINER BAIL (25) (FIGURE 12) OVER STUD (S) IN MAIN RACK LOCK CONTROL LINK (36).
4. POSITION PRINTER CONTROL CAM FOLLOWER (13) (PLATE 13) IN FRONT OF ROLL (G) ON RIGHT ARM (12) OF PRINTER CONTROL SHAFT (11).
5. POSITION OFFSET RACK GUIDE COMB (15) (PLATE 10) BETWEEN PRINTER FRAMES WITH LEFT ARM UNDER PRINTING LEVER SPRING SHAFT (30) (PLATE 13).
6. ENGAGE FORK OF PLATEN INDEXING BAIL (15) (PLATE 11) WITH STUD (E) IN PLATEN INDEXING CONTROL LEVER (7) AND INSERT SHAFT (16) THRU BAIL, PRINTER FRAME AND OFFSET RACK GUIDE COMB (15) (PLATE 10). REPLACE KEEPER ON SHAFT INSIDE PRINTER FRAME.
7. REPLACE TWO PRINTER CLAMP BARS (30) (FIGURE 20) WITH SCREWS (31).
8. REPLACE SCREW (14) (PLATE 10) IN RIGHT ARM OF OFFSET RACK GUIDE COMB (15).
9. CONNECT LOWER END OF PLATEN SPACING LINK (10) ON STUD IN PLATEN INDEXING CAM FOLLOWER (11) WITH KEEPER.
10. REHOOK CAM GEAR LINER SPRINGS (16) (PLATE 13) TO KEYBOARD.
11. REHOOK PLATEN FEED PAWL SPRING (18) (PLATE 10).
12. REHOOK ACCUMULATOR BALANCE SPRING (24) TO FRONT PRINTER SHAFT (28) (PLATE 12).
13. REPLACE MOTOR COVER (25) (PLATE 10).
14. REPLACE REAR LATERAL BRACE (16) WITH FOUR PINS (13).
15. REPLACE PAPER ROLL AND SHAFT (26).

TO TIME PRINTER DIALS (4) (PLATE 13) WITH CAM GEARS (23), DEPRESS ADD KEY (NO AMOUNT KEYS DEPRESSED) AND HAND CRANK MACHINE THRU UNTIL ROLL (J) ON PRINTER CONTROL CAM FOLLOWER (13) ENTERS LOW DWELL OF PRINTER CONTROL CAM (14). AT THIS TIME, MANUALLY RELEASE PRINTING LEVER RELEASE LATCHES (22) FROM PRINTING LEVERS (1). DISENGAGE DIAL LOCK PAWL (5) FROM DIAL AND ROTATE DIAL TO ZERO PRINTING POSITION. ROTATE SYMBOL DIAL SO MINUS LINES UP WITH #1 ON ADJACENT DIAL TO THE LEFT.

THE FOLLOWING PAGES (61 THROUGH 87) COVER INSTRUCTIONS FOR THE OPERATION, DISASSEMBLY, REASSEMBLY AND ADJUSTMENTS FOR MAIN RACK DRIVE MECHANISM, ACCUMULATOR SECTION AND ACCUMULATOR CONTROLS.

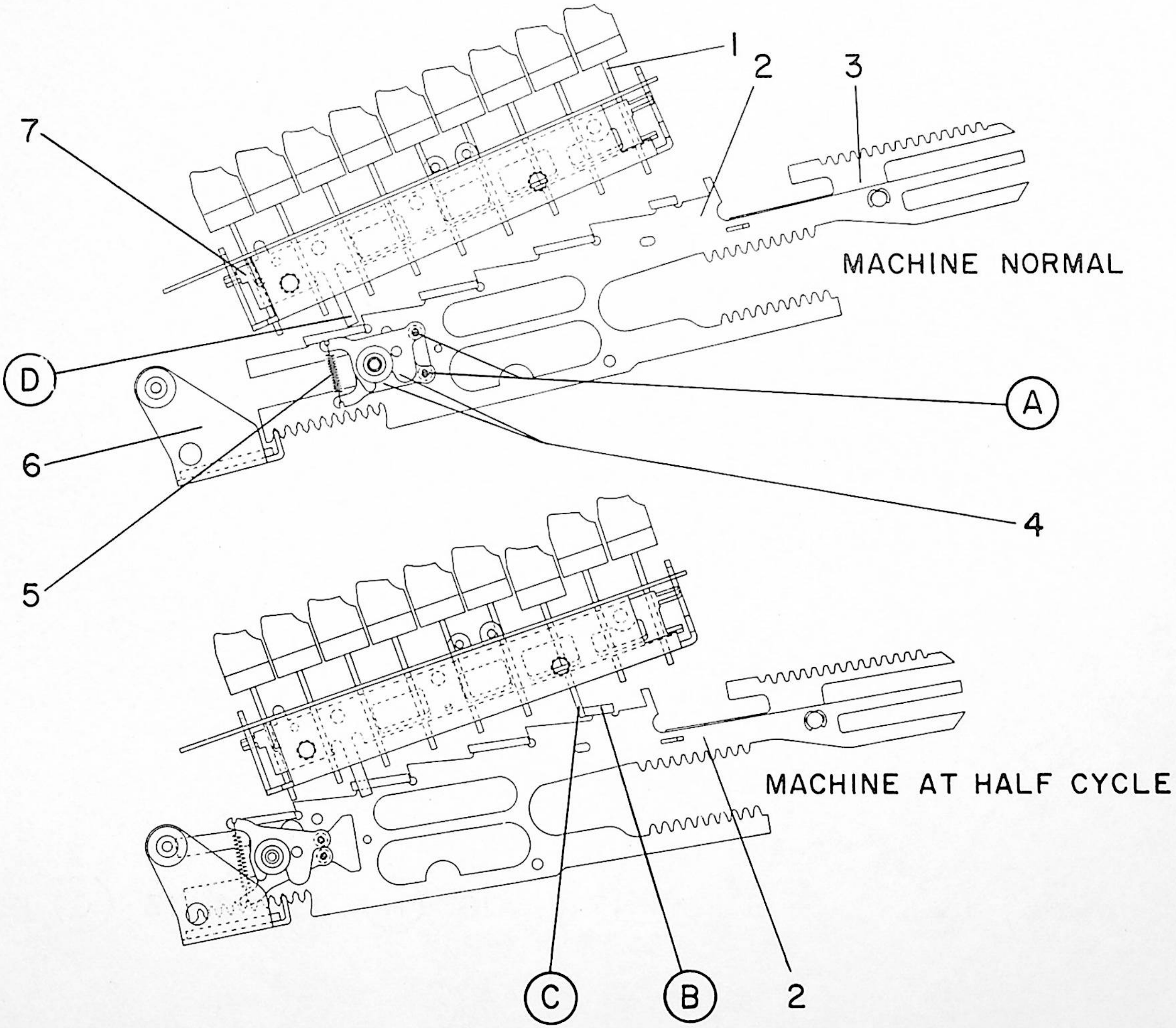
MAIN RACK AND RACK DRIVE MECHANISM

MAIN RACKS (2) (PLATE 15) CONNECT THREE MAJOR UNITS OF MACHINE: NAMELY, KEYBOARD, ACCUMULATOR AND PRINTER. RACKS (2) IN THEIR TRAVEL ARE BLOCKED IN ONE OF FOUR WAYS: (A) ZERO STOP (D) ON ZERO STOP AND LOCK BAR (7); (B) AMOUNT KEYSTEMS (1); (C) MAIN RACK LOCK (6); AND (D) ACCUMULATOR ZERO STOPS, (ACCUMULATOR ZERO STOPS WILL BE EXPLAINED UNDER SUBJECT OF ACCUMULATION).

MAIN RACKS ARE COMPOSED OF TWO PARTS: MAIN RACK (2) AND MAIN RACK OFFSET (3). MAIN RACK TRANSMITS INFORMATION FROM ITEM ENTERED IN KEYBOARD TO ACCUMULATOR. MAIN RACK OFFSET FURTHER TRANSMITS THIS INFORMATION TO PRINTER.

MACHINE NORMAL, MAIN RACKS (2) ARE LOCKED IN POSITION BY MAIN RACK LOCK (6). ALSO, ROLLERS (A) ON MAIN RACK CONTROL ARMS (4) WILL BE RESTING IN UPPER AND LOWER NOTCHES OF MAIN RACKS THRU TENSION OF SPRINGS (5). ZERO STOPS (D) ON ZERO STOP AND LOCK BARS (7) WILL BE IN THE PATH OF RACKS.

WHEN AN AMOUNT KEY (1) IS DEPRESSED, ZERO STOP (D) WILL BE MOVED TO RIGHT, OUT OF PATH OF MAIN RACK (2). LOWER EXTENSION (C) OF AMOUNT KEY WILL BE POSITIONED IN PATH OF EXTENSION (B) ON RACK TO LIMIT FORWARD TRAVEL OF MAIN RACK (2).



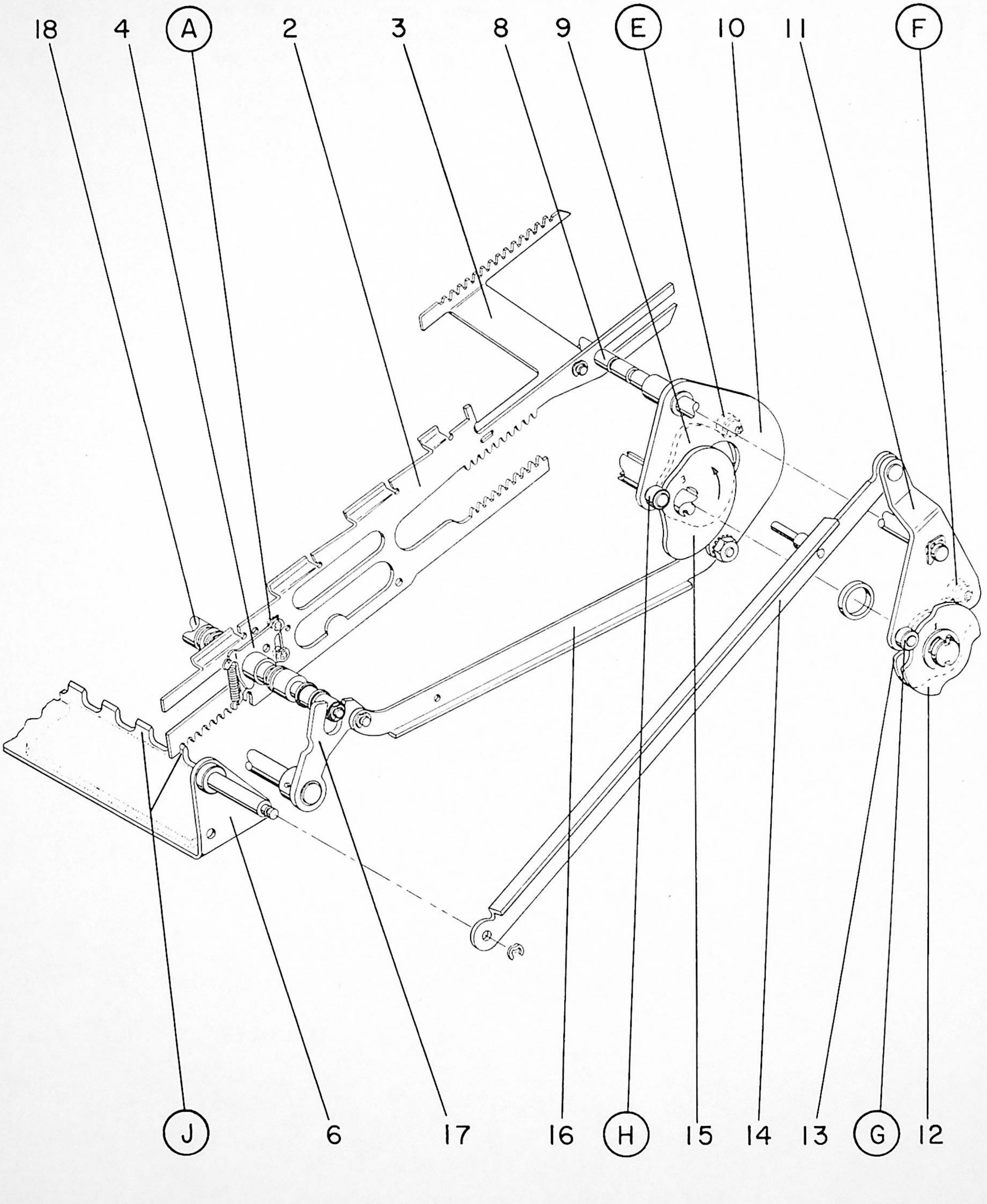


PLATE 16 MAIN RACK DRIVE MECHANISM

ON FIRST HALF OF MACHINE CYCLE, AS MAIN CONTROL SHAFT STARTS TO ROTATE, MAIN RACK LOCK CONTROL DRIVE CAM (12)(PLATE 16) WILL CONTACT OUTER ROLL (G) ON MAIN RACK LOCK CONTROL CAM FOLLOWER (11), ROTATING SAME CLOCKWISE, WHICH MOVES MAIN RACK LOCK CONTROL CAM FOLLOWER LINK (14) REARWARD, LOWERING MAIN RACK LOCK (6) OUT OF MESH WITH MAIN RACKS (2). AS MAIN CONTROL SHAFT CONTINUES TO ROTATE, MAIN RACK CONTROL DRIVE CAM (15) WILL CONTACT FRONT ROLL (H) ON MAIN RACK CONTROL CAM FOLLOWER (10), ROTATING SAME CLOCKWISE, DRIVING MAIN RACK CONTROL CAM FOLLOWER LINK (16) AND MAIN RACK PARALLEL ARM AND SHAFT (17) FORWARD. THRU MAIN RACK CONTROL ARMS (4), MAIN RACK (2) WILL BE DRIVEN FORWARD UNTIL EXTENSION (B)(PLATE 15) OF RACK LIMITS AGAINST LOWER EXTENSION (C) OF AMOUNT KEY (1). RACKS TO THE LEFT OF LISTED ITEM WILL BE HELD IN APPROXIMATELY NORMAL OR ZERO POSITION BY ZERO STOPS (D) ON ZERO STOP AND LOCK BARS (7).

WHEN MAIN RACKS (2) LIMIT ON ZERO STOPS (D) OR AMOUNT KEY EXTENSION (C), MAIN RACK CONTROL ARMS (4) YIELD AND CONTINUE TO TRAVEL FORWARD, DUE TO ACTION OF MAIN RACK CONTROL CAM FOLLOWER (10)(PLATE 16), MAIN RACK CONTROL CAM FOLLOWER LINK (16) AND MAIN RACK CONTROL DRIVE CAM (15).

NEAR THE END OF FIRST HALF OF CYCLE, MAIN RACK LOCK CONTROL RETURN CAM (13) WILL CONTACT INNER ROLL (F) ON MAIN RACK LOCK CONTROL CAM FOLLOWER (11), ROTATING SAME COUNTERCLOCKWISE, WHICH MOVES MAIN RACK LOCK CONTROL CAM FOLLOWER LINK (14) FORWARD, RAISING MAIN RACK LOCK (6) IN MESH WITH MAIN RACKS. THIS WILL LOCK MAIN RACKS IN POSITION WHEN PRINTING TAKES PLACE.

ON SECOND HALF OF MACHINE CYCLE, MAIN RACK LOCK CONTROL DRIVE CAM (12) WILL AGAIN CONTACT OUTER ROLL (G) ON MAIN RACK LOCK CONTROL CAM FOLLOWER (11), ROTATING SAME CLOCKWISE, WHICH MOVES MAIN RACK LOCK CONTROL CAM FOLLOWER LINK (14) REARWARD, LOWERING MAIN RACK LOCK (6) OUT OF MESH WITH RACKS. AS MAIN CONTROL SHAFT CONTINUES TO RESTORE, MAIN RACK CONTROL RETURN CAM (9) WILL CONTACT REAR ROLL (E) ON MAIN RACK CONTROL CAM FOLLOWER (10), ROTATING SAME COUNTER-CLOCKWISE, DRIVING MAIN RACK CONTROL CAM FOLLOWER LINK (16), MAIN RACK PARALLEL ARM AND SHAFT (17) AND MAIN RACK CONTROL ARMS (4) REARWARD. ROLLERS (A) ON MAIN RACK CONTROL ARMS WILL ENTER NOTCHES IN MAIN RACKS, DRIVING THEM REARWARD TO NORMAL POSITION.

AT THE END OF CYCLE, MAIN RACK LOCK (6) IS RAISED TO LOCK RACKS IN NORMAL POSITION, THRU MAIN RACK LOCK CONTROL CAM FOLLOWER LINK (14), MAIN RACK LOCK CONTROL CAM FOLLOWER (11) AND MAIN RACK LOCK CONTROL DRIVE CAM (12).

WHEN A NUMBER NINE AMOUNT KEY IS DEPRESSED, FORWARD MOVEMENT OF MAIN RACK (2) IS LIMITED BY LOWER FRONT END OF MAIN RACK CONTACTING EXTENSIONS (J) OF MAIN RACK LOCK (6). IN THIS CASE, MAIN RACK LOCK SERVES TWO PURPOSES: TO LOCK MAIN RACKS AND AS A NINE STOP.

REMOVAL OF MAIN RACKS AND DRIVE MECHANISM

1. HAND CRANK MACHINE THRU TO HALF-CYCLE ON BLANK ADD OPERATION. (ROLL ON PRINTER CONTROL CAM FOLLOWER IN LOW DWELL OF CAM)
2. REMOVE KEYBOARD.
3. REMOVE PRINTER.
4. REMOVE TOTAL BAIL (1) BY REMOVING KEEPER FROM RIGHT END (FIGURE 1).

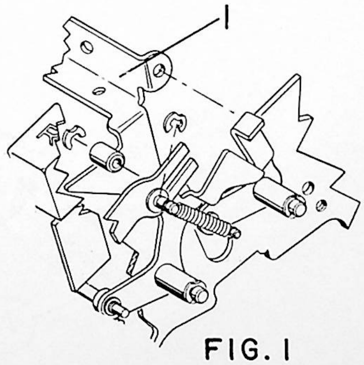


FIG. 1

5. REMOVE LOWER FRONT LATERAL BRACE BY REMOVING TWO RUBBER FEET, TWO FRONT SCREWS FOR CROSS BRACES AND TWO PINS IN SIDE FRAMES.

6. DISCONNECT MAIN RACK LOCK CONTROL CAM FOLLOWER LINK (14)(PLATE 16) FROM STUD IN MAIN RACK LOCK (6) BY REMOVING KEEPER.

7. REMOVE MAIN RACK LOCK (6) BY REMOVING KEEPER FROM STUD IN LEFT FRAME.

8. REMOVE TWO SCREWS (1)(FIGURE 2) FROM RIGHT FRONT MACHINE COVER GROMMET BRACKET (2)

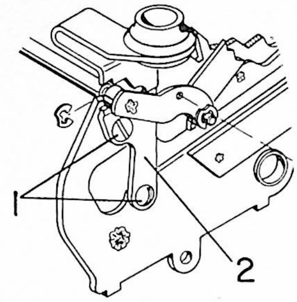


FIG. 2

9. DISCONNECT MAIN RACK CONTROL CAM FOLLOWER LINK (16)(PLATE 16) FROM MAIN RACK PARALLEL ARM (17) BY REMOVING KEEPER.

10. MOVE MAIN RACK CONTROL SHAFT (18) FORWARD TO DISENGAGE MAIN RACK PARALLEL ARMS (17) FROM SHAFT (18) BEING CAREFUL NOT TO DISENGAGE ROLLERS (A) ON MAIN RACK CONTROL ARMS (4) FROM RACKS (2). INSERT A 3/32" WIRE THRU HOLES IN MAIN RACK CONTROL ARMS TO HOLD THEM TOGETHER.

MOVE RACKS TO REAR TO DISENGAGE THEM FROM MAIN RACK CONTROL SHAFT (18). MOVE SHAFT TO RIGHT AND REMOVE MAIN RACK CONTROL ARMS (4) FROM MACHINE AS A UNIT.

11. REMOVE MAIN RACKS (2) FROM MACHINE, STARTING WITH CENTER RACK.

12. REMOVE SYMBOL CONTROL RACK (1)(FIGURE 3) BY REMOVING KEEPER AND SPACER (2) FROM CENTER OF RACK. REMOVE BUSHING (3) FOR SYMBOL RACK FROM STUD IN LEFT FRAME.

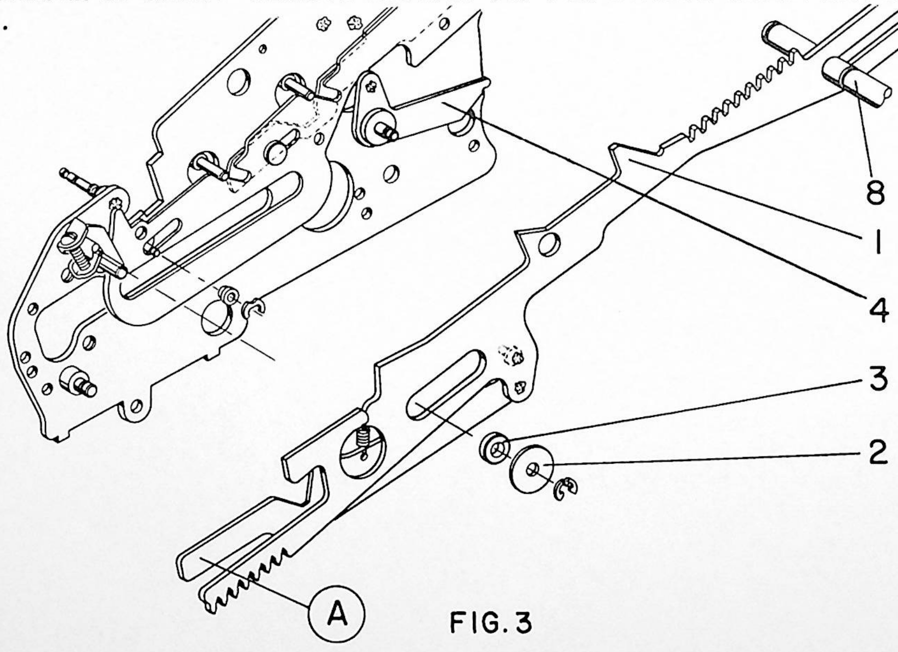


FIG. 3

13. REMOVE SYMBOL STOP BELLCRANK (4) FROM STUD IN LEFT FRAME.

REPLACING MAIN RACKS AND DRIVE MECHANISM

1. REPLACE SYMBOL STOP BELLCRANK (4) ON STUD IN LEFT FRAME, ENGAGING STUD (A) ON BELLCRANK WITH SLOT IN ACCUMULATOR POSITIONING BAR (1)(FIGURE 4).

2. REPLACE FORK IN REAR END OF SYMBOL CONTROL RACK (1)(FIGURE 3) IN EXTREME LEFT SLOT IN MAIN RACK SUPPORT SHAFT (8) AND OVER STUD IN LEFT FRAME. REPLACE BUSHING (3) ON STUD IN SLOT OF SYMBOL RACK AND REPLACE SPACER (2) AND KEEPER.

3. REPLACE MAIN RACKS (2)(PLATE 16) IN PROPER SLOTS IN MAIN RACK SUPPORT SHAFT (8) SO OFFSET RACKS (3) ARE IN CORRECT SLOT OF OFFSET RACK GUIDE COMB. ALSO, POSITION LOWER PORTION OF RACK IN SLOTS OF ROLLERS ON TRANSFER SHAFT (12) (PLATE 18). CHECK PRINTER CONTROL CAM FOLLOWER AND RIBBON FEED PAWL FOR PROPER POSITION.

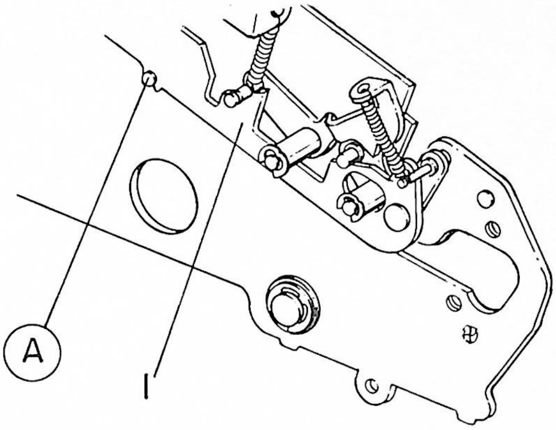


FIG. 4

4. REPLACE MAIN RACK CONTROL SHAFT (18)(PLATE 16) AND MAIN RACK CONTROL ARMS (4), PLACING ROLLERS (A) IN SLOTS OF RACKS. PULL RACKS FORWARD SLIGHTLY, INSERTING RACKS IN GROOVES OF MAIN RACK CONTROL SHAFT (18). REMOVE 3/32" WIRE FROM MAIN RACK CONTROL ARMS (4). POSITION MAIN RACK PARALLEL ARMS (17) OVER ROLLS ON MAIN RACK PARALLEL SHAFT (18). MOVE SHAFT (18) TO REAR, PLACING YIELDING ARM (A) (FIGURE 3) ON SYMBOL CONTROL RACK (1) UNDER ROLLER ON LEFT END OF SHAFT (18) (PLATE 16). CONNECT MAIN RACK CONTROL CAM FOLLOWER LINK (16) ON MAIN RACK PARALLEL ARM (17) WITH KEEPER.

5. REPLACE TWO SCREWS (1) IN RIGHT MACHINE COVER GROMMET MOUNTING BRACKET (2) (FIGURE 2). NOTE: UPPER SCREW HAS FLAT HEAD.

6. REPLACE MAIN RACK LOCK (6)(PLATE 16) WITH KEEPER ON STUD IN LEFT FRAME.

7. CONNECT MAIN RACK LOCK CONTROL CAM FOLLOWER LINK (14) ON STUD IN MAIN RACK LOCK (6) WITH KEEPER.

8. REPLACE LOWER FRONT LATERAL BRACE WITH TWO PINS IN FRAME. REPLACE TWO SCREWS FOR CROSS BRACES AND REPLACE TWO RUBBER FEET.

9. REPLACE TOTAL BAIL (1)(FIGURE 5), PLACING FORK IN LEFT END OF BAIL OVER STUD (A) IN TOTAL KEY ACTUATED BELLCRANK. REPLACE KEEPER ON STUD IN RIGHT FRAME.

10. REPLACE PRINTER. CAUTION: BEFORE REPLACING PRINTER, CHECK CAM GEARS FOR BEING IN TIME WITH RELEASE LATCHES. ALSO, MAIN RACKS AND SYMBOL RACK FOR LIMITING TO THE REAR ON MAIN RACK SUPPORT SHAFT (8)(PLATE 16).

11. REPLACE KEYBOARD.

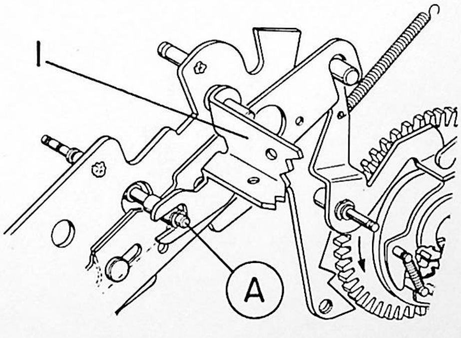


FIG. 5

MAIN RACK AND DRIVE INSPECTIONS AND ADJUSTMENTS

1. EXTENSIONS (J) (FIGURE 6) OF MAIN RACK LOCK (6) SHOULD ALL BE PARALLEL WITH TEETH OF MAIN RACKS (2).

   ADJ. FORM INDIVIDUAL EXTENSIONS (J).

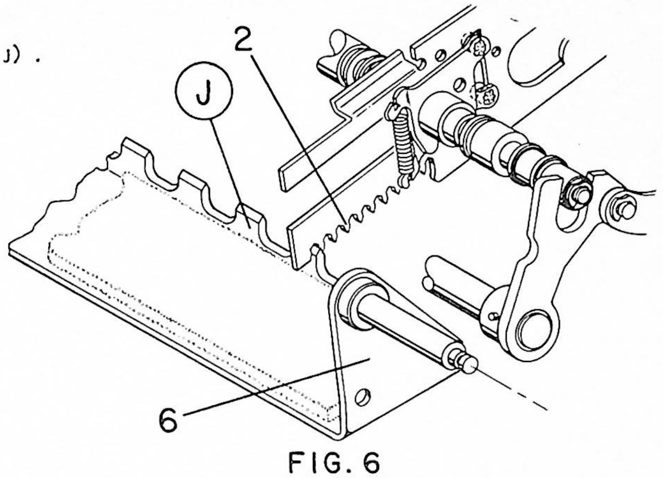


FIG. 6

2. MAIN RACK LOCK (6) (FIGURE 7) SHOULD MOVE FREELY IN AND OUT OF MESH WITH MAIN RACKS (2) IN NORMAL POSITION AND WITH RACKS LIMITING ON ZERO STOPS (D) ON ZERO STOP AND LOCK BARS (7).

   RACK DRIVESHAFT SHOULD BE [illegible] TO WITHIN .002-.005 OF A LIMIT

   ADJ. RECHECK THE .010" TO .015" CLEARANCE BETWEEN ZERO STOP (D) AND RACK EXTENSION AS SPECIFIED IN INSPECTION #6 UNDER KEYBOARD GROUP OF SECTION #1. ADJUST MAIN RACK CONTROL CAM FOLLOWER LINK ECCENTRIC (A) TO A DIFFERENT POSITION.

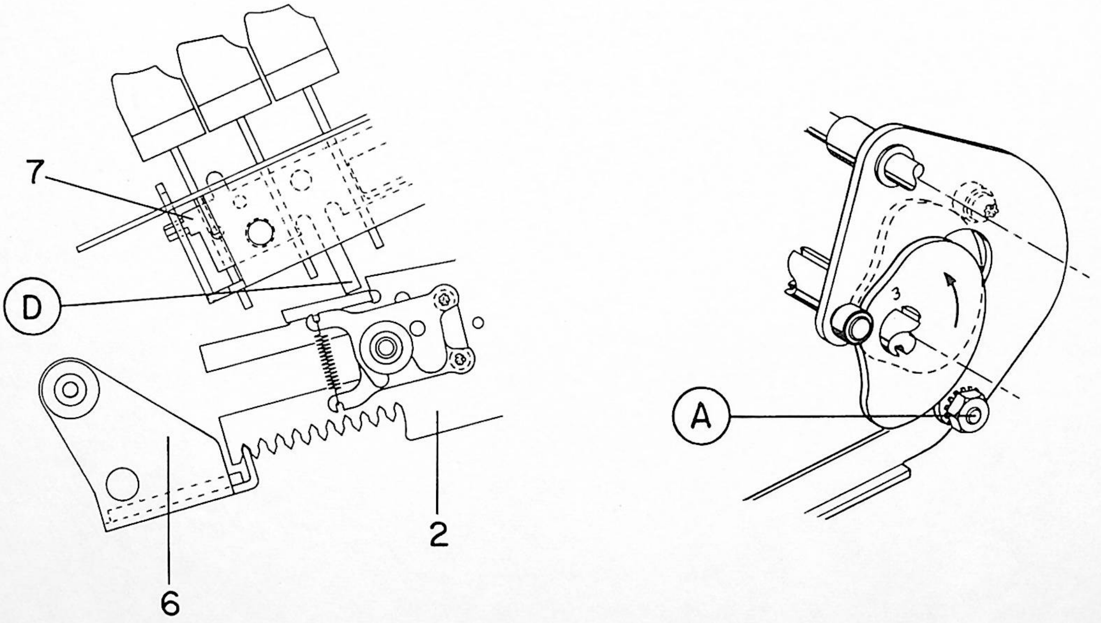


FIG. 7

3. MACHINE NORMAL, EXTENSIONS (J) (FIGURE 8) OF MAIN RACK LOCK (6) SHOULD NOT BOTTOM IN TEETH OF RACKS (2) AND, WITH MACHINE TURNED THRU UNTIL MAIN RACK LOCK IS OPENED AT MAXIMUM, EXTENSIONS (J) SHOULD CLEAR TEETH OF RACKS BY ABOUT .030".

ADJ. FORM RIGHT ARM OF MAIN RACK LOCK (6) TO MOVE STUD (A) TO THE FRONT OR REAR.

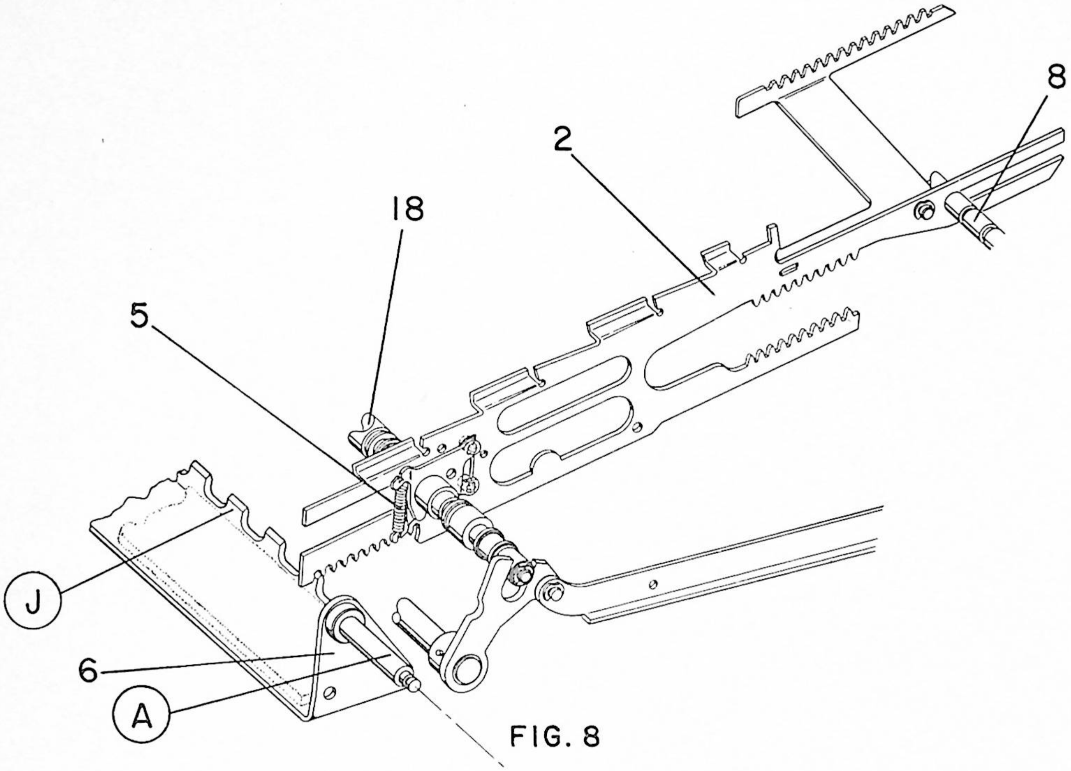


FIG. 8

4. MAIN RACKS (2) (FIGURE 8) SHOULD BE FREE THROUGHOUT ENTIRE TRAVEL TO FRONT AND REAR OF MACHINE. TO CHECK THIS, DEPRESS CORRECTION KEY AND HAND CRANK MACHINE THRU UNTIL JUST BEFORE MAIN RACK LOCK (6) ENGAGES TEETH OF RACKS. UNHOOK MAIN RACK CONTROL ARM SPRINGS (5) AND MANUALLY MOVE RACKS TO THE FRONT AND REAR.

ADJ. CHECK RACKS FOR STRAIGHT. OPEN OR CLOSE SLOTS AT REAR OR FRONT ENDS OF MAIN RACKS (2) TO MAINTAIN MINIMUM PLAY OF RACKS WITH MAIN RACK SUPPORT SHAFT (8) AND MAIN RACK CONTROL SHAFT (18).

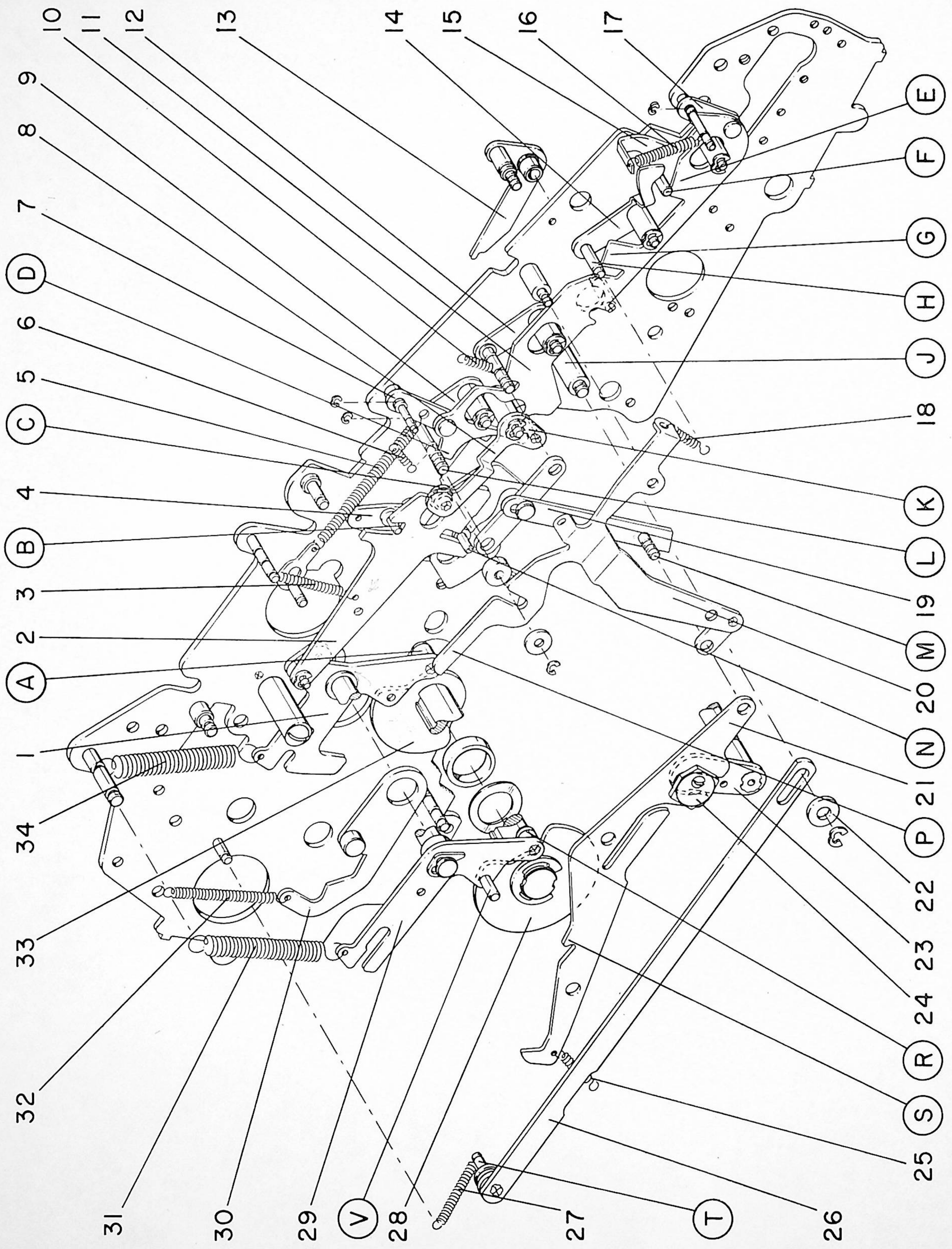


PLATE 17 ACCUMULATOR CONTROL MECHANISM

ACCUMULATOR POSITIONING

THE ACCUMULATOR SECTION HAS THREE POSSIBLE POSITIONS, DEPENDING ON THE TYPE OF OPERATION. (ADD, SUBTRACT, NON-ADD, SUB-TOTAL AND TOTAL)

MACHINE NORMAL, ACCUMULATOR SECTION WILL BE IN A NEUTRAL POSITION, OUT OF MESH WITH RACKS. ALSO ACCUMULATOR POSITIONING LINK (2) (PLATE 17) WILL BE IN UPWARD POSITION, ENGAGED WITH UPPER STUD (B) ON LEFT ACCUMULATOR POSITIONING CAM (4) THRU SPRING (3).

POSITION OF ACCUMULATOR POSITIONING LINK (2) IS CONTROLLED BY MOVEMENT OF ACCUMULATOR POSITIONING CONTROL LEVER (8) AND ACCUMULATOR POSITIONING BAR (11) WHICH, IN TURN, IS CONTROLLED BY CONTROL KEY BELLCRANKS. TO SEGREGATE THE VARIOUS OPERATIONS, EACH ONE WILL BE EXPLAINED UNDER SEPARATE HEADINGS, STARTING WITH ADD KEY.

ADD KEY AND REPEAT KEY OPERATION

WHEN EITHER FRONT OR RIGHT ADD KEY OR REPEAT KEY IS DEPRESSED, ACCUMULATOR POSITIONING BAR (11) WILL REMAIN TO THE REAR, KEEPING ACCUMULATOR POSITIONING LINK (2) IN UP POSITION, ENGAGED WITH STUD (B) IN ACCUMULATOR POSITIONING CAM (4).

AS MAIN CONTROL SHAFT STARTS ITS CYCLE, HIGH CONTOUR OF TOTAL CONTROL CAM (33) WILL CONTACT ROLL (A) ON TOTAL CONTROL CAM FOLLOWER (1), ROTATING SAME COUNTER-CLOCKWISE. THIS ACTION WILL DRIVE ACCUMULATOR POSITIONING LINK (2) REARWARD, WHICH WILL ROTATE LEFT ACCUMULATOR POSITIONING CAM (4) COUNTER-CLOCKWISE. AS CAM (4) IS ROTATED, HIGH POINT OF RACEWAY IN CAM (4) WILL CONTACT ROLL (N) (PLATE 18) ON LEFT END OF RACK GEAR SHAFT (4) WHICH RAISES ACCUMULATOR SECTION, MESHING RACK GEARS (2) WITH UPPER PORTION OF RACKS. AT THE SAME TIME, ROLL (M) ON LEFT ARM (L) OF ACCUMULATOR PARALLEL SHAFT (22), RIDING IN RACEWAY OF CAM (4), WILL ROTATE ACCUMULATOR PARALLEL SHAFT (22). THRU ROLL (B) ON RIGHT ARM (G) OF PARALLEL SHAFT (22) RIDING IN RACEWAY OF RIGHT ACCUMULATOR POSITIONING CAM (7) ROTATES CAM, CAUSING HIGH POINT OF RACEWAY TO CONTACT RIGHT ROLL (C) ON RACK GEAR SHAFT (4), RAISING RIGHT SIDE OF ACCUMULATOR SECTION IN MESH WITH RACKS. THIS INSURES RAISING RIGHT SIDE EVENLY WITH LEFT SIDE.

AT APPROXIMATELY HALF CYCLE OF MAIN CONTROL SHAFT, ROLL (A) (PLATE 17) ON TOTAL CONTROL CAM FOLLOWER (1) WILL MOVE TO LOW DWELL OF TOTAL CONTROL CAM (33). THIS WILL PERMIT CAM FOLLOWER (1) TO RESTORE THRU SPRING (34). AT THE SAME TIME, ACCUMULATOR POSITIONING LINK (2) WILL BE MOVED FORWARD, ROTATING ACCUMULATOR POSITIONING CAM (4) CLOCKWISE, RESTORING ACCUMULATOR SECTION TO NEUTRAL POSITION.

THE PURPOSE OF ACCUMULATOR CENTRALIZER ARM (25) (PLATE 18) IS TO HOLD ACCUMULATOR SECTION, THRU LEFT ACCUMULATOR POSITIONING CAM (4), IN NORMAL OR NEUTRAL POSITION.

SUBTRACT KEY OPERATION

WHEN SUBTRACT KEY IS DEPRESSED, SUBTRACT KEY ACTUATED BELLCRANK (15) (PLATE 17) WILL BE ROTATED.

OUTER STUD (F) OF BELLCRANK (15) WILL CONTACT CAMMING SURFACE (E) OF ACCUMULATOR POSITIONING BAR (11), DRIVING IT FORWARD. THIS WILL ROTATE ACCUMULATOR POSITIONING CONTROL LEVER (8) COUNTER-CLOCKWISE AND, THRU STUD (C) ON LEVER ENGAGED WITH SLOT IN ACCUMULATOR POSITIONING LINK (2), LOWERS LINK TO ENGAGE LOWER STUD (N) ON LEFT ACCUMULATOR POSITIONING CAM (4).

AS MAIN CONTROL SHAFT STARTS ITS CYCLE, HIGH CONTOUR OF TOTAL CONTROL CAM (33) CONTACTS ROLL (A) ON TOTAL CONTROL CAM FOLLOWER (1), ROTATING SAME COUNTERCLOCKWISE.

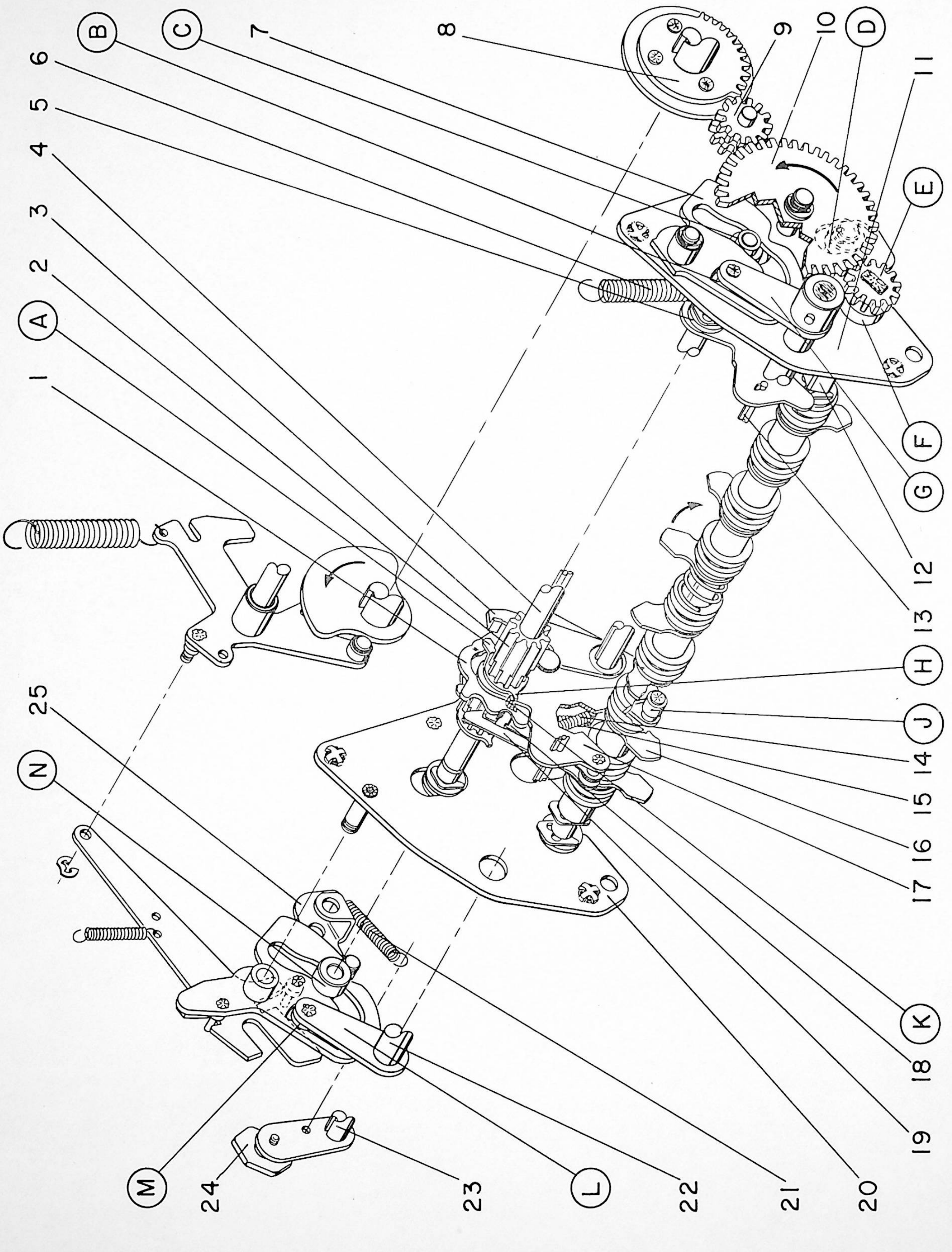


PLATE 18 ACCUMULATOR SECTION

THIS ACTION WILL DRIVE ACCUMULATOR POSITIONING LINK (2) REARWARD, WHICH WILL ROTATE ACCUMULATOR POSITIONING CAM (4) CLOCKWISE. AS CAM (4) IS ROTATED, HIGH POINT OF RACEWAY IN CAM WILL CONTACT ROLL (N) (PLATE 18) ON LEFT END OF RACK GEAR SHAFT (4) WHICH LOWERS ACCUMULATOR SECTION, MESHING RACK GEARS (2) WITH LOWER PORTION OF RACKS. AT THE SAME TIME, ROLL (M) ON LEFT ARM (L) OF ACCUMULATOR PARALLEL SHAFT (22), RIDING IN RACEWAY OF CAM, WILL ROTATE SHAFT (22). THRU ROLL (B) ON RIGHT ARM (G) OF PARALLEL SHAFT (22) RIDING IN SLOT OF RIGHT ACCUMULATOR POSITIONING CAM (7), ROTATES CAM, CAUSING HIGH POINT OF RACEWAY TO CONTACT ROLL (C) ON RIGHT END OF RACK GEAR SHAFT (4), LOWERING RIGHT SIDE OF ACCUMULATOR SECTION IN MESH WITH RACKS. THIS INSURES LOWERING RIGHT SIDE EVENLY WITH LEFT SIDE.

AT APPROXIMATELY HALF-CYCLE OF MAIN CONTROL SHAFT, ROLL (A) (PLATE 17) ON TOTAL CONTROL CAM FOLLOWER (1) WILL MOVE TO LOW DWELL OF TOTAL CONTROL CAM (33). THIS WILL PERMIT CAM FOLLOWER (1) TO RESTORE THRU SPRING (34) WHICH MOVES ACCUMULATOR POSITIONING LINK (2) FORWARD, WHICH, IN TURN, ROTATES LEFT ACCUMULATOR POSITIONING CAM (4) COUNTER-CLOCKWISE, RESTORING ACCUMULATOR SECTION TO NEUTRAL POSITION. AS MAIN CONTROL SHAFT CONTINUES TO RESTORE, MAIN RACKS AND SYMBOL RACK WILL BE DRIVEN REARWARD TO NORMAL POSITION.

AT THE END OF CYCLE, WHEN CLUTCH CONTROL BAR RESTORES, SUBTRACT ACTUATED BELLCRANK (15) WILL RESTORE THRU SPRING (16). THIS WILL PERMIT ACCUMULATOR POSITIONING BAR (11), SYMBOL STOP BELLCRANK (13), ACCUMULATOR POSITIONING CONTROL LEVER (8) AND ACCUMULATOR POSITIONING LINK (2) TO RESTORE THRU TENSION OF SPRINGS (3) AND (5).

NON-ADD KEY OPERATION

WHEN THE NON-ADD KEY IS DEPRESSED, NON-ADD KEY ACTUATED BELLCRANK (14) WILL BE ROTATED. OUTER STUD (H) OF BELLCRANK (14) WILL CONTACT CAMMING SURFACE (G) OF ACCUMULATOR POSITIONING BAR (11), DRIVING IT PART WAY FORWARD. THIS WILL ROTATE ACCUMULATOR POSITIONING CONTROL LEVER (8) COUNTER-CLOCKWISE AND, THRU STUD (C) ENGAGED WITH SLOT IN ACCUMULATOR POSITIONING LINK (2), LOWERS LINK MIDWAY BETWEEN THE UPPER STUD (B) AND LOWER STUD (N) ON ACCUMULATOR POSITIONING CAM (4).

AS MAIN CONTROL SHAFT STARTS ITS CYCLE, HIGH CONTOUR OF TOTAL CONTROL CAM (33) CONTACTS ROLL (A) ON TOTAL CONTROL CAM FOLLOWER (1), ROTATING SAME COUNTER-CLOCKWISE. THIS ACTION WILL DRIVE ACCUMULATOR POSITIONING LINK (2) REARWARD BETWEEN UPPER STUD (B) AND LOWER STUD (N) OF ACCUMULATOR POSITIONING CAM (4), LEAVING ACCUMULATOR SECTION IN NEUTRAL POSITION WITH MAIN RACKS.

AT APPROXIMATELY HALF-CYCLE OF MAIN CONTROL SHAFT, ROLL (A) ON TOTAL CONTROL CAM FOLLOWER (1) WILL MOVE TO LOW DWELL OF TOTAL CONTROL CAM (33), PERMITTING CAM FOLLOWER (1) AND ACCUMULATOR POSITIONING LINK (2) TO RESTORE THRU SPRING (34).

AT THE END OF CYCLE, CLUTCH CONTROL BAR WILL RESTORE TO DISENGAGE CLUTCH AND SHUT OFF MOTOR. AS CLUTCH CONTROL BAR RESTORES, NON-ADD KEY ACTUATED BELLCRANK (14) WILL RESTORE THRU SPRING (18). THIS WILL PERMIT ACCUMULATOR POSITIONING BAR (11), SYMBOL STOP BELLCRANK (13), ACCUMULATOR POSITIONING CONTROL LEVER (8) AND ACCUMULATOR POSITIONING LINK (2) TO RESTORE THRU TENSION OF SPRINGS (3) AND (5).

TOTAL KEY OPERATION

WHEN TOTAL KEY IS DEPRESSED, TOTAL KEY ACTUATED BELLCRANK (9) WILL BE ROTATED. OUTER STUD (L) OF BELLCRANK (9) WILL CONTACT CAMMING SURFACE (D) OF ACCUMULATOR POSITIONING BAR (11), DRIVING IT FORWARD, WHICH WILL POSITION SYMBOL STOP BELLCRANK (13), ACCUMULATOR POSITIONING CONTROL LEVER (8) AND ACCUMULATOR POSITIONING LINK (2)

THE SAME AS DEPRESSION OF SUBTRACT KEY. AT THE SAME TIME, OUTER STUD (L) OF BELLCRANK (9) WILL ACTUATE ZERO STOP CONTROL LINK CONNECTOR (19) DOWNWARD WHICH WILL PIVOT ZERO STOP ACTUATING LINK (21), POSITIONING EXTENSION (S) UP IN THE PATH OF STUD (V) ON SUB-TOTAL CONTROL CAM FOLLOWER (29).

AS MAIN CONTROL SHAFT STARTS ITS CYCLE, HIGH CONTOUR OF TOTAL CONTROL CAM (33) CONTACTS ROLL (A) ON TOTAL CONTROL CAM FOLLOWER (1), ROTATING SAME COUNTER-CLOCKWISE. THIS ACTION WILL DRIVE ACCUMULATOR POSITIONING LINK (2) REARWARD, WHICH ROTATES ACCUMULATOR POSITIONING CAM (4) CLOCKWISE, LOWERING ACCUMULATOR SECTION, PLACING RACK GEARS IN MESH WITH LOWER PORTION OF RACKS. POSITIONING OF ACCUMULATOR SECTION IS ACCOMPLISHED IN THE SAME MANNER AS FOR SUBTRACT KEY OPERATION. AT APPROXIMATELY THE SAME TIME, SUB-TOTAL CONTROL CAM (28) WILL CONTACT ROLL (R) ON SUB-TOTAL CONTROL CAM FOLLOWER (29), ROTATING SAME COUNTER-CLOCKWISE. THIS CAUSES STUD (V) IN CAM FOLLOWER TO DRIVE ZERO STOP ACTUATING LINK (21) FORWARD, WHICH ROTATES ZERO STOP SHAFT (23), PRESENTING ACCUMULATOR ZERO STOPS (3) (PLATE 18) TO RACK GEARS (2). AT THE SAME TIME, EXTENSION (P) (PLATE 17) OF POWER KEY RELEASE ARM (20) WILL ACTUATE KEY RELEASE BAR TO RESTORE ANY AMOUNT KEYS THAT WERE DEPRESSED. THIS ACTION WILL OCCUR BEFORE MAIN RACKS ARE DRIVEN FORWARD.

AT APPROXIMATELY HALF-CYCLE OF MAIN CONTROL SHAFT, ROLL (A) ON TOTAL CONTROL CAM FOLLOWER (1) WILL MOVE TO LOW DWELL OF TOTAL CONTROL CAM (33). THIS WILL PERMIT CAM FOLLOWER (1) TO RESTORE THRU SPRING (34). AT THE SAME TIME, ACCUMULATOR POSITIONING LINK (2) WILL BE MOVED FORWARD, ROTATING ACCUMULATOR POSITIONING CAM (4) COUNTER-CLOCKWISE, RESTORING ACCUMULATOR SECTION TO NEUTRAL POSITION.

NEAR THE END OF CYCLE, SUB-TOTAL CONTROL CAM FOLLOWER (29) WILL RESTORE THRU SPRING (31). STUD (V) WILL RELEASE ZERO STOP ACTUATING LINK (21), PERMITTING ZERO STOP SHAFT (23), ACCUMULATOR ZERO STOPS (3) (PLATE 18) AND POWER KEY RELEASE ARM (20) (PLATE 17) TO RESTORE THRU TENSION OF SPRING (21).

AT THE END OF CYCLE, CLUTCH CONTROL BAR WILL RESTORE TO DISENGAGE CLUTCH AND SHUT OFF MOTOR. WHEN CLUTCH CONTROL BAR RESTORES, TOTAL KEY ACTUATED BELLCRANK (9) (PLATE 17) WILL RESTORE THRU SPRING (6). THIS WILL PERMIT ACCUMULATOR POSITIONING BAR (11) TO RESTORE THRU SPRINGS (3) AND (5). ALSO, AS BELLCRANK (9) RESTORES, ZERO STOP CONTROL LINK CONNECTOR (19) AND ZERO STOP ACTUATING LINK (21) RESTORE THRU SPRING (25).

SUB-TOTAL KEY OPERATION

THE SUB-TOTAL KEY OPERATION IS BASICALLY THE SAME AS TOTAL OPERATION EXCEPT THE ACCUMULATOR SECTION REMAINS IN MESH WITH LOWER PORTION OF RACKS FOR APPROXIMATELY THE FULL CYCLE. THIS IS ACCOMPLISHED IN THE FOLLOWING MANNER:

WHEN SUB-TOTAL KEY IS DEPRESSED, SUB-TOTAL KEY ACTUATED BELLCRANK (12) WILL BE ROTATED, CAUSING STUD (J) TO MOVE SUB-TOTAL LINK (26) FORWARD. REAR STUD (T) ON SUB-TOTAL LINK WILL INTERLOCK SUB-TOTAL CONTROL CAM FOLLOWER (29) WITH TOTAL CONTROL CAM FOLLOWER (1).

AS MAIN CONTROL SHAFT STARTS ITS CYCLE, TOTAL CONTROL CAM (33) WILL ROTATE TOTAL CONTROL CAM FOLLOWER (1) TO POSITION ACCUMULATOR SECTION IN MESH WITH LOWER PORTION OF RACKS AND SUB-TOTAL CONTROL CAM (28) WILL ROTATE SUB-TOTAL CONTROL CAM FOLLOWER (29) TO PRESENT ACCUMULATOR ZERO STOPS (PLATE 18) TO RACK GEARS (2).

AT APPROXIMATELY HALF-CYCLE, TOTAL CONTROL CAM (33) (PLATE 17) WILL RELEASE FROM TOTAL CONTROL CAM FOLLOWER (1) BUT, AT THIS TIME, HIGH CONTOUR OF SUB-TOTAL CONTROL CAM (28) WILL KEEP SUB-TOTAL CONTROL CAM FOLLOWER (29) ROTATED WHICH, IN TURN, WILL KEEP TOTAL CONTROL CAM FOLLOWER (1) ROTATED THRU INTERLOCKING STUD (T). THIS WILL PREVENT ACCUMULATOR SECTION FROM RESTORING ON LAST HALF OF MACHINE CYCLE. THEREFORE, AS RACKS ARE DRIVEN REARWARD, THE SAME AMOUNT IS RE-ENTERED IN ACCUMULATOR SECTION THAT WAS TAKEN OUT ON FIRST HALF OF CYCLE.

AT THE END OF CYCLE, SUB-TOTAL CONTROL CAM (28) WILL RELEASE SUB-TOTAL CONTROL CAM FOLLOWER (29), PERMITTING IT AND TOTAL CONTROL CAM FOLLOWER (1) TO RESTORE THRU SPRINGS (31) AND (34). THIS, IN TURN, WILL ALLOW ACCUMULATOR POSITIONING LINK (2) TO RESTORE ACCUMULATOR SECTION TO NEUTRAL POSITION AND ZERO STOP ACTUATING LINK (21) TO RESTORE ACCUMULATOR ZERO STOPS TO NORMAL.

ALSO, AT END OF CYCLE, CLUTCH CONTROL BAR WILL RESTORE TO DISENGAGE CLUTCH AND SHUT OFF MOTOR. AS CLUTCH CONTROL BAR RESTORES, SUB-TOTAL KEY ACTUATED BELLCRANK (12) WILL RESTORE, PERMITTING ACCUMULATOR POSITIONING BAR (11), SYMBOL STOP BELLCRANK (13), ACCUMULATOR POSITIONING CONTROL LEVER (8) AND ACCUMULATOR POSITIONING LINK (2) TO RESTORE THRU SPRINGS (3) AND (5). SUB-TOTAL LINK (26) WILL BE RESTORED BY ITS SPRING (27).

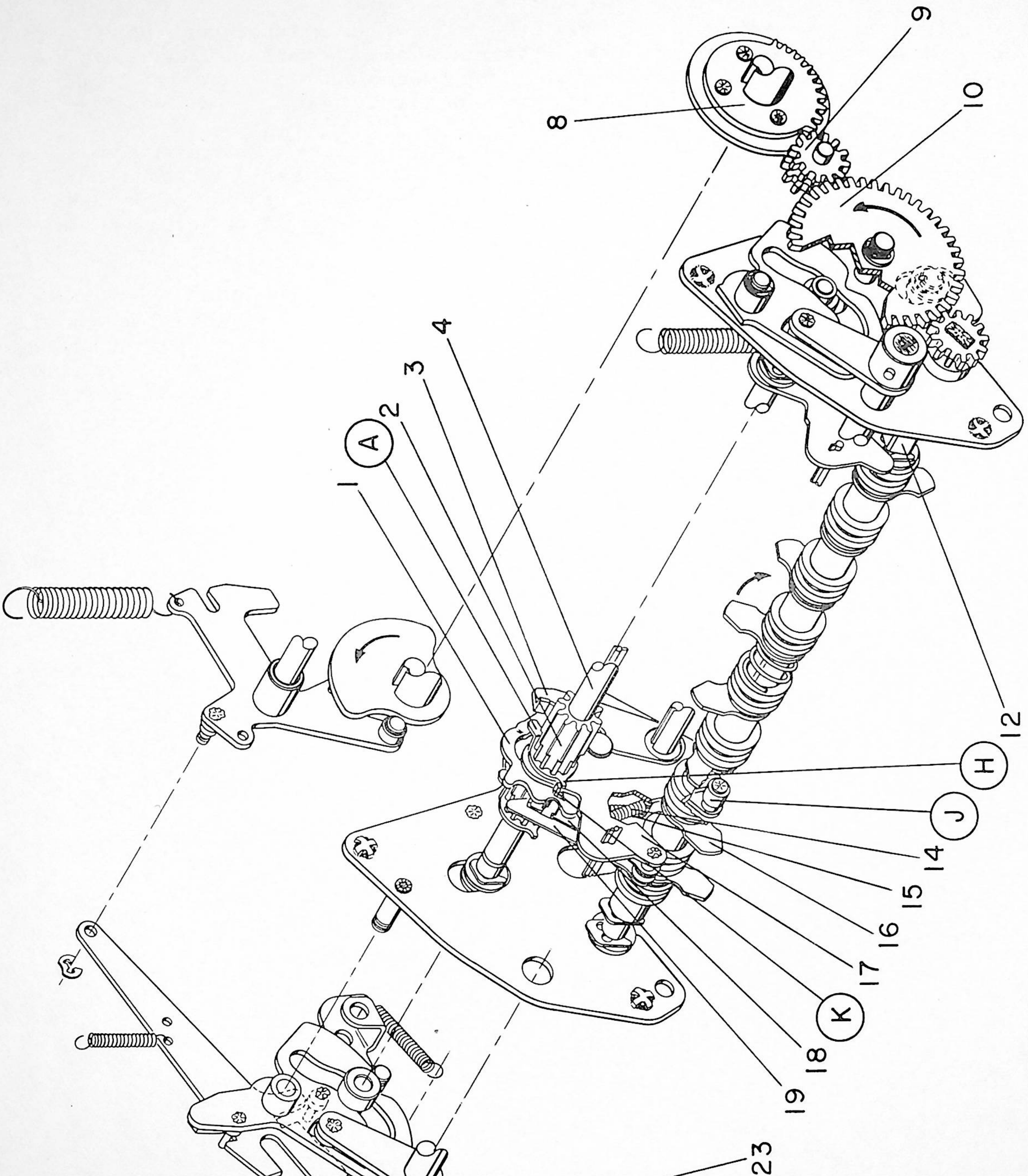


PLATE 19 ACCUMULATOR SECTION

ACCUMULATOR SECTION MECHANISM

THE ACCUMULATOR SECTION IS COMPRISED OF SEVERAL MECHANISMS - RACK GEARS, TRANSFER PAWLS, TRANSFER SHAFT AND ACCUMULATOR ZERO STOPS WHICH WILL BE EXPLAINED UNDER SEPARATE HEADINGS.

ACCUMULATOR RACK GEARS

THE REMINGTON FULL KEYBOARD MACHINES WILL ACCUMULATE IN THE WHEELS ONE DIGIT (ONE TO NINE) AT A TIME IN ALL COLUMNS SIMULTANEOUSLY ON ONE FULL STROKE OF THE MAIN CONTROL SHAFT.

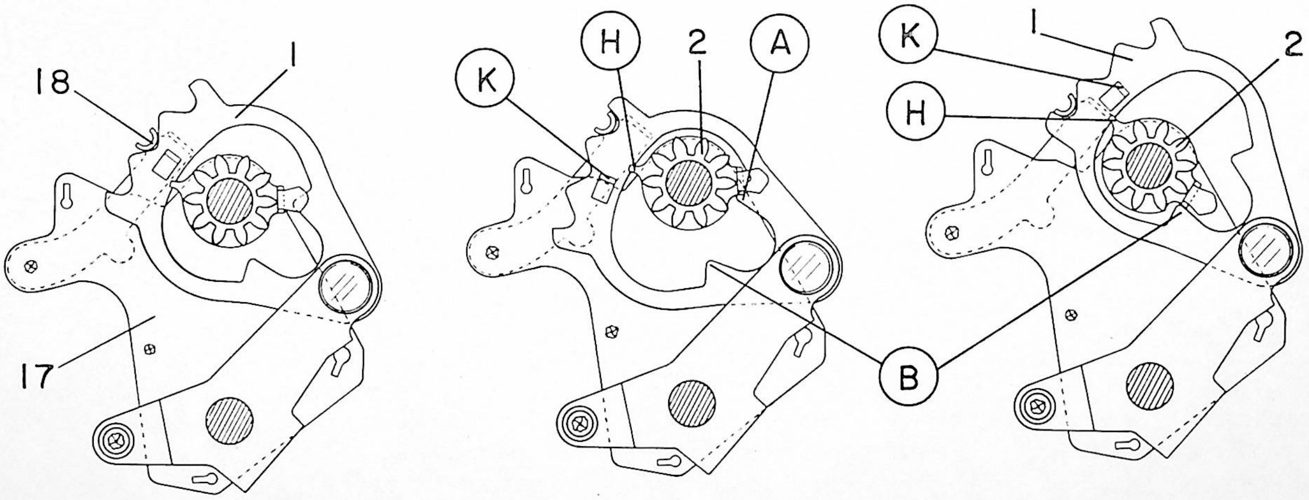
THERE IS ONE TEN TOOTH RACK GEAR (2) (PLATE 19) MOUNTED ON SHAFT (4) FOR EACH COLUMN AND ONE RACK GEAR DETENT (19) MOUNTED ON ACCUMULATOR INTERMEDIATE BRACE (17). RACK GEAR DETENT IS CONSTANTLY ENGAGED WITH GEAR THRU TENSION OF SPRING (14) TO PREVENT RACK GEAR (2) FROM ROTATING WHEN ACCUMULATOR SECTION IS IN NEUTRAL POSITION. (RACK GEARS (2) OUT OF MESH WITH MAIN RACKS)

EACH RACK GEAR (2) HAS A CONDITIONING CAM WITH TWO EARS - A ZERO STOP EAR (A) WHICH PROVIDES A MEANS FOR STOPPING ROTATION OF RACK GEAR DURING A SUB-TOTAL OR TOTAL OPERATION AND A TRANSFER CONDITIONING EAR (H) WHICH RECORDS THE MOVEMENT OF RACK GEAR FROM NINE TO ZERO ON AN ADD OPERATION AND FROM ZERO TO NINE ON A SUBTRACT OPERATION. THIS EAR CONDITIONS TRANSFER PAWL (1) IN NEXT ORDER TO LEFT FOR PLUS OR MINUS MOVEMENT OF NEXT ORDER RACK GEAR.

MACHINE NORMAL, TRANSFER CONDITIONING EAR (H) WILL BE BELOW EAR (K) ON TRANSFER PAWL. THIS INDICATES THAT RACK GEAR (2) IS IN NORMAL OR ZERO POSITION.

TRANSFER PAWL MECHANISM

TRANSFER PAWLS (1) ARE MOUNTED ON ZERO STOP SHAFT (23) TO LEFT OF EACH RACK GEAR (2) AND ARE CONDITIONED BY TRANSFER CONDITIONING EAR (H) ON RACK GEAR TO THE RIGHT. (FIG. 9) EXAMPLE: WHEN FIRST COLUMN RACK GEAR (2) IS ROTATED FROM NINE TO ZERO ON ADD OPERATION, EAR (H) WILL CONDITION TRANSFER PAWL (1) FOR SECOND COLUMN RACK GEAR TO THE LEFT; LIKEWISE, IF FIRST COLUMN RACK GEAR IS ROTATED FROM ZERO TO NINE ON SUBTRACT OPERATION, EAR (H) WILL CONDITION TRANSFER PAWL FOR SECOND COLUMN RACK GEAR.



NEUTRAL POSITION PLUS POSITION NEGATIVE POSITION

FIG. 9

TRANSFER PAWLS (1)(FIGURE 9) HAVE THREE DETENTED POSITIONS - NEUTRAL, PLUS AND MINUS. TRANSFER PAWL DETENT (18), MOUNTED ON ACCUMULATOR INTERMEDIATE BRACE (17), ARE USED TO HOLD TRANSFER PAWLS IN DETENTED POSITION.

FOR EACH TRANSFER PAWL (1)(PLATE 19) THERE IS A TRANSFER CAM (16) MOUNTED ON TRANSFER SHAFT (12). ON THE LAST THIRD OF MACHINE CYCLE, TRANSFER SHAFT WILL BE ROTATED 360° CAUSING TRANSFER CAMS TO CONTACT ROLLERS (J) ON TRANSFER PAWLS (1), DRIVING THEM FORWARD AND, IF TRANSFER PAWL (1) HAS BEEN CONDITIONED POSITIVE OR NEGATIVE, RACK GEAR WILL BE ROTATED ONE SPACE.

TRANSFER CAMS (16) ARE MOUNTED ON TRANSFER SHAFT (12) IN A SPIRALED MANNER SO AS TO CONSECUTIVELY CONTACT ROLLER (J) ON TRANSFER PAWLS (1) AS SHAFT IS ROTATED ITS 360° MOTION.

ACCUMULATOR ZERO STOPS

THE ACCUMULATOR ZERO STOPS (3) ARE KEYED ON ZERO STOP SHAFT (23) PARALLEL TO THE RACK GEARS (2). THERE IS A ZERO STOP (3) FOR EACH RACK GEAR (2). ON A TOTAL OR SUBTOTAL OPERATION, ZERO STOPS (3) ARE POSITIONED TO INTERCEPT ZERO STOP EARS (A) ON RACK GEARS (2) TO STOP FORWARD TRAVEL OF MAIN RACKS. THIS WILL PERMIT THE AMOUNT THAT IS STORED OR ACCUMULATED IN RACK GEARS TO BE PRINTED.

ACCUMULATION

TO CLEARLY UNDERSTAND HOW MACHINE ADDS, SUBTRACTS OR NON-ADDS, THE POSITIONING OF ACCUMULATOR SECTION AND THE OPERATION OF MAIN RACKS AND DRIVE MUST BE THOROUGHLY UNDERSTOOD AS WAS EXPLAINED UNDER THEIR RESPECTIVE SUBJECTS.

TO EXPLAIN ACCUMULATION AND A CARRY-OVER OPERATION, WE WILL ADD SEVEN AND THREE.

MACHINE NORMAL, RACK GEARS (2)(PLATE 19) WILL BE IN ZERO POSITION AND TRANSFER PAWLS WILL BE IN NEUTRAL POSITION.

ADDITION

WHEN NUMBER SEVEN AMOUNT KEY IS DEPRESSED, ZERO STOP (D) ON ZERO STOP AND LOCK BAR (7) WILL BE POSITIONED OUT OF THE PATH OF UNITS RACK (2)(PLATE 15).

WHEN MAIN CONTROL SHAFT STARTS TO ROTATE, ACCUMULATOR SECTION WILL BE RAISED TO MESH RACK GEARS (2)(PLATE 19) WITH UPPER TEETH OF RACKS. AS MAIN CONTROL SHAFT CONTINUES TO ROTATE, UNITS MAIN RACK WILL BE DRIVEN FORWARD THRU MAIN RACK CONTROL ARMS (4)(PLATE 16), MAIN RACK CONTROL LINK (16), MAIN RACK CONTROL CAM FOLLOWER (10) AND MAIN RACK CONTROL DRIVE CAM (15) UNTIL RACK LIMITS ON NUMBER SEVEN AMOUNT KEY EXTENSION. THE FORWARD MOVEMENT OF UNITS RACK WILL ROTATE RACK GEAR (2)(PLATE 19) COUNTERCLOCKWISE SEVEN SPACES. NEAR THE END OF FIRST HALF OF CYCLE, UNIT AND TENTH PRINTING LEVERS ARE RELEASED TO PRINT FIGURE ON TAPE.

AT START OF SECOND HALF OF CYCLE, ACCUMULATOR IS CENTERED BETWEEN UPPER AND LOWER TEETH OF RACKS, LEAVING UNITS RACK GEAR (2) IN SEVENTH POSITION. UNIT AND TENTH PRINTING LEVERS WILL BE RESTORED IN MESH WITH CAM GEARS. MAIN RACKS WILL BE RESTORED TO NORMAL THRU CONTINUED ROTATION OF MAIN CONTROL SHAFT. ALSO, TRANSFER SHAFT (12) ROTATES 360° BUT DOES NOT PERFORM ANY OPERATION AT THIS TIME.

TO ADD THREE TO THE SEVEN THAT IS STORED IN UNITS RACK GEAR (2), WE REPEAT ABOVE OPERATION; HOWEVER, ON FIRST HALF OF CYCLE, WHEN UNITS MAIN RACK IS DRIVEN FORWARD AND

ROTATES UNITS RACK GEAR (2) FROM NINE TO ZERO, TRANSFER CONDITIONING EAR (H) CONTACTS EAR (K) ON TRANSFER PAWL (1) IN TENTH COLUMN, CONDITIONING IT TO A PLUS POSITION AS SHOWN IN FIGURE 9.

TRANSFER PAWL (1) WILL REMAIN IN THIS POSITION THRU TRANSFER PAWL DETENT (18) UNTIL IT IS ACTIVATED BY TRANSFER CAM (16) (PLATE 19) ON SECOND HALF OF CYCLE.

AT THE END OF FIRST HALF OF CYCLE, ACCUMULATOR WILL BE CENTERED.

AT START OF SECOND HALF OF CYCLE, UNIT AND TENTH COLUMN PRINTING LEVERS WILL BE RELEASED TO PRINT FIGURE ON TAPE.

RACKS WILL BE RESTORED THRU CONTINUED ROTATION OF MAIN CONTROL SHAFT.

ON THE LAST THIRD OF MAIN CONTROL SHAFT CYCLE, TRANSFER SHAFT (12) WILL BE ROTATED CLOCKWISE THRU GENEVA GEAR (8), INTERMITTENT GEAR (9) AND INTERMEDIATE GEAR (10).

AS TRANSFER SHAFT (12) ROTATES, TRANSFER CAM (16) CONTACTS ROLLER (J) ON TENTH COLUMN TRANSFER PAWL (1), DRIVING IT FORWARD. CARRYING POINT (A) (FIGURE 9) ON INSIDE OF TRANSFER PAWL (1) WILL ENGAGE TOOTH ON TENTH COLUMN RACK GEAR (2), ROTATING IT ONE SPACE COUNTERCLOCKWISE FROM ZERO TO ONE. AS CARRYING POINT (A) ROTATES RACK GEAR (2), TOOTH ON RACK GEAR CONTACTS BOTTOM OF CARRYING POINT (A), RAISING TRANSFER PAWL TO A NEUTRAL POSITION. THE FORWARD AND UPWARD MOVEMENT OF TRANSFER PAWL ALLOWS EAR (K) TO PASS IN FRONT OF AND OVER TRANSFER CONDITIONING EAR (H).

WHEN HIGH SURFACE OF TRANSFER CAM HAS DRIVEN TRANSFER PAWL (1) TO EXTREME OPERATED POSITION, CARRYING POINTS (A) AND (B) ARE BOTH IN POSITION TO ACT AS A POSITIVE DETENT TO PREVENT RACK GEAR FROM OVERTHROWING.

AS TRANSFER SHAFT (12) (PLATE 19) CONTINUES TO ROTATE, TRANSFER CAM (16) RELEASES FROM ROLLER (J) ON TRANSFER PAWL (1), PERMITTING IT TO RESTORE TO NORMAL THRU SPRING (15) ON TRANSFER PAWL DETENT (18). THIS POSITIONS EAR (K) ON TRANSFER PAWL IN A POSITION TO BE CONTACTED BY TRANSFER CONDITIONING EAR (H) ON RACK GEAR DURING NEXT ENTRY.

AT THIS TIME, WE HAVE A ZERO STORED IN UNITS COLUMN RACK GEAR (2) AND A ONE STORED IN THE TENTH COLUMN RACK GEAR.

SUBTRACTION

UNDER THE SUBJECT OF ACCUMULATION (ADDITION) OPERATION, IT WAS EXPLAINED HOW SEVEN AND THREE WERE ADDED TOGETHER TO PRODUCE ZERO IN UNITS COLUMN RACK GEAR (2) AND ONE IN TENTH COLUMN RACK GEAR. IN THIS SUBJECT, WE WILL EXPLAIN HOW FOUR IS SUBTRACTED FROM THIS AMOUNT STORED IN ACCUMULATOR.

WHEN NUMBER FOUR AMOUNT KEY IS DEPRESSED, ZERO STOP ON ZERO STOP AND LOCK BAR WILL BE POSITIONED OUT OF THE PATH OF UNITS COLUMN MAIN RACK. SUBTRACT KEY DEPRESSED, ACCUMULATOR POSITIONING LINK (2) (PLATE 17) WILL BE LOWERED TO ENGAGE LOWER STUD (N) OF ACCUMULATOR POSITIONING CAM (4). AS MAIN CONTROL SHAFT STARTS TO ROTATE, ACCUMULATOR WILL BE LOWERED TO MESH RACK GEARS WITH LOWER TEETH OF RACKS. AS MAIN CONTROL SHAFT CONTINUES TO ROTATE, UNITS MAIN RACK (2) (PLATE 16) WILL BE DRIVEN FORWARD THRU MAIN RACK CONTROL ARMS (4), MAIN RACK CONTROL LINK (16), MAIN RACK CONTROL CAM FOLLOWER (10) AND MAIN RACK DRIVE CONTROL CAM (15) UNTIL UNITS RACK LIMITS ON NUMBER FOUR AMOUNT KEY EXTENSION. THE FORWARD MOVEMENT OF UNITS RACK WILL ROTATE RACK GEAR (2) (PLATE 19) CLOCKWISE FOUR SPACES FROM ZERO TO SIX. AS RACK GEAR IS ROTATED FROM ZERO TO NINE, TRANSFER CONDITIONING EAR (H) CONTACTS EAR (K) ON TRANSFER PAWL (1)

IN TENTH COLUMN, CONDITIONING IT TO A MINUS POSITION AS SHOWN IN FIGURE 9. TRANSFER PAWL (1) WILL REMAIN IN THIS POSITION THRU TRANSFER PAWL DETENT (18) UNTIL IT IS ACTIVATED BY TRANSFER CAM ON LAST THIRD OF MACHINE CYCLE.

NEAR THE END OF FIRST HALF OF CYCLE, UNIT AND TENTH PRINTING LEVERS ARE RELEASED TO PRINT FIGURE ON TAPE.

AT START OF SECOND HALF OF CYCLE, ACCUMULATOR IS CENTERED BETWEEN UPPER AND LOWER TEETH OF RACKS, LEAVING UNITS RACK GEAR IN NUMBER SIX POSITION. UNIT AND TENTH PRINTING LEVERS WILL BE RESTORED IN MESH WITH CAM GEARS. RACKS WILL BE RESTORED TO NORMAL THRU CONTINUED ROTATION OF MAIN CONTROL SHAFT.

ON LAST THIRD OF CYCLE, TRANSFER SHAFT (12) (PLATE 19) WILL BE ROTATED CLOCKWISE THRU GENEVA GEAR (8), INTERMITTENT GEAR (9) AND INTERMEDIATE GEAR (10).

AS TRANSFER SHAFT (12) ROTATES, TRANSFER CAM (16) CONTACTS ROLLER (J) ON TENTH COLUMN TRANSFER PAWL (1), DRIVING IT FORWARD, CARRYING POINT (B) (FIGURE 9) ON INSIDE OF TRANSFER PAWL (1) WILL ENGAGE TOOTH ON TENTH COLUMN RACK GEAR (2), ROTATING IT ONE SPACE CLOCKWISE FROM ONE TO ZERO. AS CARRYING POINT (B) ROTATES RACK GEAR (2), TOOTH ON GEAR CONTACTS BOTTOM OF CARRYING POINT (B), LOWERING TRANSFER PAWL (1) TO A NEUTRAL POSITION. THE FORWARD AND DOWNWARD MOVEMENT OF TRANSFER PAWL ALLOWS EAR (K) TO PASS IN FRONT OF AND OVER TRANSFER CONDITIONING EAR (H).

AS TRANSFER SHAFT (12) (PLATE 19) CONTINUES TO ROTATE, TRANSFER CAM (16) RELEASES FROM ROLLER (J) ON TRANSFER PAWL (1), PERMITTING IT TO RESTORE TO NORMAL THRU SPRING (15) ON TRANSFER PAWL DETENT (18). THIS POSITIONS EAR (K) ON TRANSFER PAWL IN A POSITION TO BE CONTACTED BY TRANSFER CONDITIONING EAR (H) ON RACK GEAR DURING NEXT ENTRY.

AT THIS TIME, WE HAVE SIX STORED IN THE UNITS COLUMN RACK GEAR (2) AND ZERO STORED IN TENTH COLUMN RACK GEAR.

NON-ADD OPERATION

THE PURPOSE OF A NON-ADD OPERATION IS TO PRINT NUMBERS ON TAPE WITHOUT ACCUMULATING IN RACK GEARS (2); I.E., TO PRINT INVOICE NUMBERS, DATES, EMPLOYEE NUMBERS OR OTHER NON-ADD INFORMATION.

WHEN THE NON-ADD KEY IS DEPRESSED, ACCUMULATOR POSITIONING LINK (2) (PLATE 17) WILL BE POSITIONED BETWEEN UPPER AND LOWER STUDS ON ACCUMULATOR POSITIONING CAM (4). THIS WILL PREVENT ACCUMULATOR SECTION FROM RAISING OR LOWERING IN MESH WITH RACKS, PREVENTING ACCUMULATION FROM OCCURRING IN RACK GEARS (2) (PLATE 19) WHEN RACKS ARE DRIVEN DURING MACHINE CYCLE.

AMOUNT ENTERED IN KEYBOARD WILL BE PRINTED ON TAPE ALONG WITH NON-ADD SYMBOL.

TOTAL OPERATION

THE PURPOSE OF A TOTAL OPERATION IS TO PRINT THE AMOUNT THAT IS STORED OR HAS BEEN ACCUMULATED IN RACK GEARS (2). THIS IS ACCOMPLISHED IN THE FOLLOWING MANNER:

WHEN THE TOTAL KEY IS DEPRESSED, PARTS WILL BE POSITIONED AS WAS EXPLAINED UNDER ACCUMULATOR POSITIONING.

AT BEGINNING OF FIRST HALF OF CYCLE, POWER KEY RELEASE ARM (20) (PLATE 17) WILL MOVE ZERO STOPS ON ZERO STOP AND LOCK BARS TO THE RIGHT, OUT OF THE PATH OF MAIN RACKS, ACCUMULATOR WILL BE LOWERED TO MESH RACK GEARS (2) (PLATE 19) WITH LOWER PORTION OF RACKS AND ACCUMULATOR ZERO STOPS (3) ARE MOVED FORWARD IN POSITION TO INTERCEPT ZERO STOP EAR (A) TO LIMIT ROTATION OF RACK GEARS.

MAIN RACKS WILL BE MOVED FORWARD, ROTATING RACK GEARS (2) CLOCKWISE UNTIL ZERO STOP EARS (A) CONTACT ACCUMULATOR ZERO STOPS (3). THIS RESTORES RACK GEAR TO ZERO POSITION WHILE, AT THE SAME TIME, ALLOWING MAIN RACK TO MOVE SAME NUMBER OF SPACES AS RACK GEAR IS TURNED. AT THE END OF FIRST HALF OF CYCLE, PRINTING LEVERS WILL BE RELEASED TO PRINT FIGURE ON TAPE ALONG WITH TOTAL SYMBOL.

ON THE SECOND HALF OF CYCLE, ACCUMULATOR WILL BE CENTERED BETWEEN UPPER AND LOWER TEETH OF RACKS, PRINTING LEVERS WILL BE RESTORED IN MESH WITH CAM GEAR AND MAIN RACKS WILL BE RESTORED TO NORMAL. AT END OF CYCLE, POWER KEY RELEASE ARM (20) (PLATE 17) WILL RESTORE, PERMITTING ZERO STOPS TO MOVE TO THE LEFT, IN PATH OF MAIN RACKS AND ACCUMULATOR ZERO STOPS (3) (PLATE 19) WILL MOVE REARWARD TO NORMAL POSITION.

SUB-TOTAL OPERATION

THE PURPOSE OF A SUB-TOTAL OPERATION IS TO PRINT THE AMOUNT THAT IS STORED OR HAS BEEN ACCUMULATED IN RACK GEARS (2) WHILE STILL RETAINING THIS AMOUNT IN RACK GEARS.

THIS OPERATION IS IDENTICAL TO A TOTAL OPERATION EXCEPT THAT THE ACCUMULATOR STAYS IN A LOWERED POSITION FOR APPROXIMATELY THE ENTIRE CYCLE, BEING RESTORED TO A CENTERED POSITION AT THE END OF SECOND HALF OF CYCLE. THEREFORE, THE MAIN RACKS ADD BACK INTO RACK GEARS (2) ON SECOND HALF OF CYCLE SAME AMOUNT THAT WAS TAKEN OUT OF RACK GEARS ON FIRST HALF OF CYCLE.

ACCUMULATED AMOUNT WILL BE PRINTED ON TAPE ALONG WITH SUB-TOTAL SYMBOL.

REMOVAL OF ACCUMULATOR SECTION AND CONTROLS

REMOVE KEYBOARD.

REMOVE PRINTER.

REMOVE MAIN RACKS AND DRIVE MECHANISM AS PREVIOUSLY EXPLAINED.

UNHOOK SPRING (27) FROM REAR END OF SUB-TOTAL LINK (26)(PLATE 17).

UNHOOK SPRING (32) FOR SUB-TOTAL LINK LATCH (30).

UNHOOK SPRING (31) FOR SUB-TOTAL CONTROL CAM FOLLOWER (29) FROM STUD IN LEFT SIDE FRAME.

UNHOOK SPRING (34) FOR TOTAL CONTROL CAM FOLLOWER (1) FROM STUD IN LEFT SIDE FRAME.

REMOVE KEEPER AND SPACER (22) FROM STUD (J) IN SUB-TOTAL KEY ACTUATED BELLCRANK (12) AND REMOVE SUB-TOTAL LINK (26).

UNHOOK SPRING (25) FROM STUD IN LEFT SIDE FRAME FOR ZERO STOP ACTUATING LINK (21). FORCE LINK (21) TO LEFT ENOUGH TO CLEAR STUD (V) IN SUB-TOTAL CAM FOLLOWER (29) AND RAISE LINK TO DISENGAGE FORK FROM ECCENTRIC (24) ON ZERO STOP SHAFT (23) AND FRONT END END OF LINK FROM STUD (M) IN ZERO STOP LINK CONNECTOR (19).

UNHOOK SPRING (3) FROM STUD IN LEFT SIDE FRAME FOR ACCUMULATOR POSITIONING LINK (2). REMOVE KEEPER FROM STUD IN TOTAL CONTROL CAM FOLLOWER (1) AND REMOVE LINK (2).

UNHOOK NON-ADD KEY ACTUATED BELLCRANK SPRING (18) AND SUB-TOTAL KEY ACTUATED BELLCRANK SPRING (10) FROM POWER KEY RELEASE ARM (20).

DISCONNECT LINK ON POWER KEY RELEASE ARM (20) FROM STUD (M) IN ZERO STOP LINK CONNECTOR (19).

REMOVE KEEPER FROM STUD IN LEFT SIDE FRAME FOR POWER KEY RELEASE ARM (20) AND REMOVE ARM.

REMOVE ZERO STOP LINK CONNECTOR (19) BY REMOVING TWO KEEPERS.

REMOVE ACCUMULATOR POSITIONING CONTROL LEVER (8) BY REMOVING KEEPER.

UNHOOK SPRING (6) FROM STUD IN FRAME FOR TOTAL KEY ACTUATED BELLCRANK (9).

UNHOOK SPRING (16) FROM STUD IN FRAME FOR SUBTRACT KEY ACTUATED BELLCRANK (15).

UNHOOK SPRING (5) FROM REAR ACCUMULATOR POSITIONING BAR LINK (7).

REMOVE TWO KEEPERS AND TWO SPACERS FROM STUD IN LEFT FRAME FOR REAR ACCUMULATOR POSITIONING BAR LINK (7).

REMOVE KEEPER FROM STUD IN LEFT FRAME FOR FRONT ACCUMULATOR POSITIONING BAR LINK (17). REMOVE ACCUMULATOR POSITIONING BAR (11).

REMOVE TRANSFER SHAFT INTERMEDIATE GEAR (10)(PLATE 18) BY REMOVING KEEPER.

REMOVE THREE SCREWS FOR RIGHT ACCUMULATOR SUPPORT PLATE (11) AND THREE SCREWS FOR LEFT ACCUMULATOR SUPPORT PLATE (20). REMOVE ACCUMULATOR SECTION COMPLETE.

DIS-ASSEMBLY OF ACCUMULATOR SECTION

REMOVE KEEPER FROM RIGHT END OF TRANSFER SHAFT (12) BETWEEN GEAR (E) AND BUSHING (F).

REMOVE KEEPER FROM LEFT END OF TRANSFER SHAFT (12) ON INSIDE LEFT ACCUMULATOR SUPPORT PLATE. SLIDE BUSHINGS OUT OF RIGHT AND LEFT ACCUMULATOR SUPPORT PLATES AND REMOVE TRANSFER SHAFT (12).

DRIVE PIN IN RIGHT ARM (G) OF ACCUMULATOR PARALLEL SHAFT (22) AND REMOVE ARM.

REMOVE RIGHT ACCUMULATOR POSITIONING CAM (7) AND ACCUMULATOR PARALLEL SHAFT ARM ROLL (B) BY REMOVING KEEPER. REMOVE ROLL (C) FROM RIGHT END OF RACK GEAR SHAFT (4).

REMOVE KEEPER AND BUSHING (D) FROM RIGHT END OF ZERO STOP SHAFT (23).

REMOVE RIGHT ACCUMULATOR SUPPORT PLATE (11).

UNHOOK ACCUMULATOR BALANCE SPRING (6) FROM RIGHT END OF RACK GEAR SHAFT (4).

REMOVE THREE SELF-LOCKING SHAFTS AND COMBS (13).

NOTE: LARGE DIAMETER SHAFT WILL HAVE TWO KEEPERS ON RIGHT END.

REMOVE KEEPER AND SPACER (5) FROM RACK GEAR SHAFT (4).

REMOVE TWO KEEPERS AND ONE SPACER FROM RIGHT END OF ZERO STOP SHAFT (23).

REMOVE ACCUMULATOR INTERMEDIATE BRACES (17), RACK GEARS (2), TRANSFER PAWLS (1) AND ACCUMULATOR ZERO STOPS (3) FROM RACK GEAR SHAFT (4) AND ZERO STOP SHAFT (23).

RE-ASSEMBLE IN REVERSE ORDER.

REPLACING ACCUMULATOR SECTION

REPLACE ACCUMULATOR SECTION, PLACING PROTRUSIONS IN LEFT AND RIGHT ACCUMULATOR SUPPORT PLATES IN HOLES PROVIDED IN RIGHT AND LEFT SIDE FRAMES. THIS WILL LOCATE ACCUMULATOR SECTION CORRECTLY IN MACHINE. REPLACE SIX ACCUMULATOR SECTION MOUNTING SCREWS. NOTE: TOP RIGHT SCREW HAS FLAT HEAD.

REPLACE MAIN RACKS AND DRIVE MECHANISM.

REPLACE TWO SCREWS IN RIGHT FRONT MACHINE COVER GROMMET BRACKET.

REPLACE MAIN RACK LOCK (6) (PLATE 16) AND CONNECT MAIN RACK LOCK CONTROL CAM FOLLOWER LINK (14). CONNECT MAIN RACK CONTROL CAM FOLLOWER LINK (16) TO RIGHT ARM OF MAIN RACK PARALLEL SHAFT (17) WITH KEEPER.

REPLACE LOWER FRONT LATERAL BRACE AND TWO RUBBER FEET.

REPLACE TWO CROSS BRACES.

MOUNT ACCUMULATOR POSITIONING BAR LINKS (7) AND (17) (PLATE 17) ON STUDS IN LEFT

FRAME AND POSITION SLOT IN CENTER OF BAR (11) OVER STUD IN SYMBOL CONTROL BELLCRANK (13). REPLACE KEEPERS ON INNER SLOTS OF STUDS. REPLACE TWO SPACERS ON REAR STUD, PLACING KEEPER IN SECOND SLOT OF STUD. REHOOK SPRING (5) TO REAR ACCUMULATOR POSITIONING BAR LINK (7).

REHOOK SUBTRACT KEY ACTUATED BELLCRANK SPRING (16) TO STUD IN FRAME. REHOOK TOTAL KEY ACTUATED BELLCRANK SPRING (6) TO STUD IN FRAME.

REPLACE ACCUMULATOR POSITIONING CONTROL LEVER (8) ON STUD IN LEFT FRAME WITH STUD (K) ON LEVER ENGAGED WITH SLOT IN ACCUMULATOR POSITIONING BAR (11). REPLACE KEEPER.

REPLACE ZERO STOP LINK CONNECTOR (19) ON OUTER STUDS OF SUB-TOTAL AND TOTAL KEY ACTUATED BELLCRANKS (9) AND (12) WITH STUD (M) IN LOWER END OF LINK, POINTING OUTWARD. NOTE: LONGEST ELONGATED HOLE IN HORIZONTAL LINK MOUNTS ON SUB-TOTAL KEY ACTUATED BELLCRANK STUD. REPLACE KEEPERS.

REPLACE ACCUMULATOR POSITIONING LINK (2) ON STUD IN TOTAL CONTROL CAM FOLLOWER (1) WITH SLOT IN FRONT END OF LINK FORKED OVER STUD (C) IN ACCUMULATOR POSITIONING CONTROL LEVER (8). REPLACE KEEPER AND REHOOK SPRING (3) TO STUD IN FRAME.

REHOOK TOTAL CONTROL CAM FOLLOWER SPRING (34) TO STUD IN FRAME.

REPLACE POWER KEY RELEASE ARM (20) ON STUD IN FRAME WITH SLOT IN REAR OF ARM POSITIONED BETWEEN THE TWO SPACERS ON STUD IN FRAME. ALSO, CONNECT LINK ON LOWER END OF ARM ON STUD (M) IN ZERO STOP LINK CONNECTOR (19). REPLACE KEEPER. REHOOK NON-ADD AND SUB-TOTAL KEY ACTUATED BELLCRANK SPRINGS (10) AND (18).

REPLACE ZERO STOP ACTUATING LINK (21) ON STUD (M) IN ZERO STOP LINK CONNECTOR (19) AND PLACE FORK IN LINK (21) OVER ZERO STOP SHAFT ECCENTRIC (24). REHOOK SPRING (25) TO STUD IN FRAME.

REPLACE SUB-TOTAL LINK (26), ENGAGING SLOT IN STUD (T) AT REAR OF LINK WITH SLOT IN SUB-TOTAL CONTROL CAM FOLLOWER (29). REHOOK SPRING (27) TO STUD (T). REHOOK SUB-TOTAL LINK LATCH SPRING (32). REHOOK SUB-TOTAL CAM FOLLOWER SPRING (31) TO STUD IN FRAME. REPLACE SPACER (22) AND KEEPER ON STUD (J) IN SUB-TOTAL KEY ACTUATED BELLCRANK (12).

REPLACE KEYBOARD.

REPLACE PRINTER.

HAND CRANK MACHINE TO NORMAL POSITION AND DISCONNECT MAIN RACK CONTROL CAM FOLLOWER LINK (16)(PLATE 16). MANUALLY ROTATE TRANSFER SHAFT (12)(PLATE 18) CLOCKWISE UNTIL SECOND TRANSFER CAM (16) FROM LEFT IS POINTING NEAREST DIRECTLY FORWARD AND REPLACE TRANSFER INTERMEDIATE GEAR (10) ON STUD IN RIGHT ACCUMULATOR SUPPORT PLATE, MESHING INTERMEDIATE GEAR (10) WITH TRANSFER INTERMITTENT GEAR (9) AND GEAR (E) ON TRANSFER SHAFT (12). THIS WILL TIME TRANSFER SHAFT (12) IN CORRECT RELATION WITH TRANSFER PAWLS (1).

ACCUMULATOR AND ACCUMULATOR CONTROL

INSPECTIONS AND ADJUSTMENTS

1. ACCUMULATOR ZERO STOPS (3) (FIGURE 10) SHOULD LATERALLY HAVE FULL HOLD OR BETTER ON ZERO STOP EARS (A) ON RACK GEARS (2).

   ADJ. FORM ACCUMULATOR ZERO STOPS (3) TO LEFT OR RIGHT.

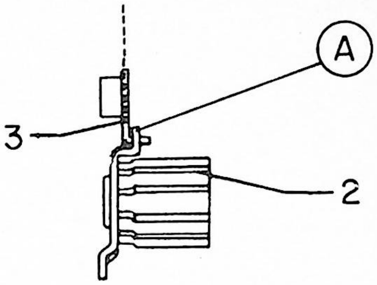


FIG. 10

2. ACCUMULATOR ZERO STOPS (3) (FIGURE 11) SHOULD PASS OVER OR UNDER ZERO STOP EARS (A) ON RACK GEARS (2) BY NO MORE THAN .010" AND SHOULD NOT MOVE RACK GEARS FROM DETENTED POSITION.

   ADJ. FORM ZERO STOPS (3) UP OR DOWN.

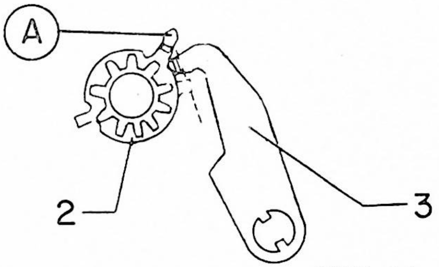


FIG. 11

3. TRANSFER CONDITIONING EAR (H) (FIGURE 12) ON RACK GEAR (2) SHOULD HAVE AT LEAST 150% HOLD LATERALLY ON CONDITIONING EAR (K) OF TRANSFER PAWL (1).

   ADJ. FORM TRANSFER CONDITIONING EAR (H) TO LEFT OR RIGHT.

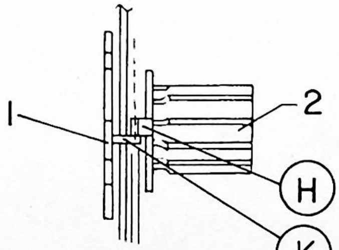


FIG. 12

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4. TRANSFER CONDITIONING EARS (H) (FIGURE 13) ON RACK GEARS (2) SHOULD DRIVE TRANSFER PAWLS (1) INTO SAFELY DETENTED POSITION WHEN PASSING FROM NINE TO ZERO OR ZERO TO NINE AND SHOULD CLEAR CONDITIONING EARS (K) ON TRANSFER PAWLS (1) BY AT LEAST .006" AFTER TRANSFER PAWLS ARE CONDITIONED.

ADJ. FORM TRANSFER CONDITIONING EAR (K) ON TRANSFER PAWL (1) TO THE FRONT OR REAR.

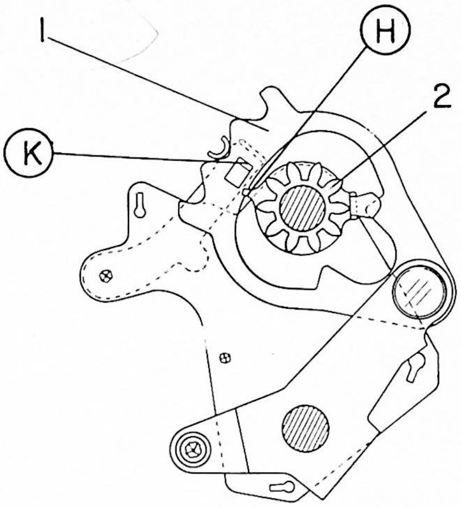


FIG. 13

5. TRANSFER CONDITIONING EARS (H) (FIGURE 13) ON RACK GEARS (2) SHOULD NORMALLY BE APPROXIMATELY .050" FROM CONDITIONING EARS (K) ON TRANSFER PAWLS (1) WHEN EITHER IN ZERO OR NINE POSITION.

ADJ. FORM TRANSFER CONDITIONING EARS (K) ON TRANSFER PAWLS (1) UP OR DOWN TO EQUALIZE CLEARANCE IN BOTH ZERO AND NINE POSITION.

6. EAR (A) (FIGURE 14) ON TRANSFER PAWL DETENT (18) SHOULD BE APPROXIMATELY IN CENTER OF TRANSFER PAWL (1).

ADJ. FORM TRANSFER PAWL DETENT (18) RIGHT OR LEFT.

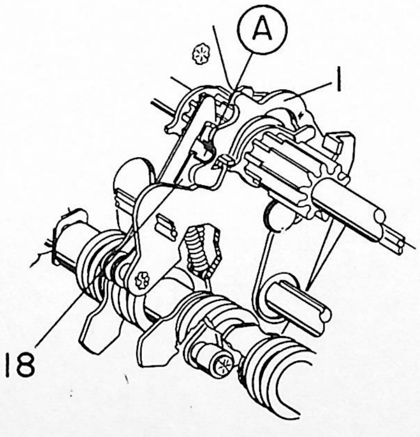


FIG. 14

7. MACHINE NORMAL, SECOND TRANSFER CAM (16) FROM LEFT END OF TRANSFER SHAFT (12) (FIGURE 15) SHOULD BE POINTING NEAREST DIRECTLY FORWARD.

ADJ. REMOVE TRANSFER INTERMEDIATE GEAR (10) AND ROTATE TRANSFER SHAFT (12) TO DESIRED POSITION.

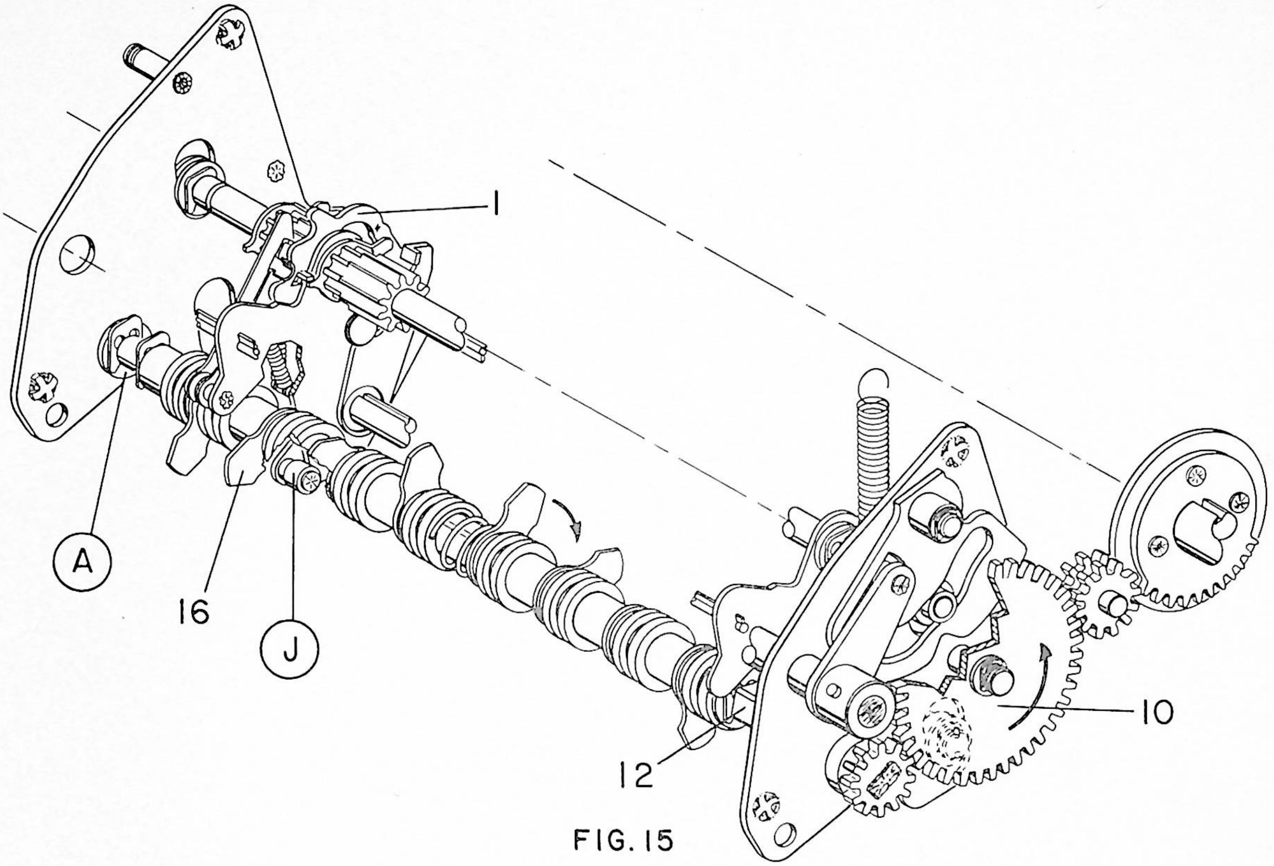


FIG. 15

8. TRANSFER CAMS (16) (FIGURE 15) SHOULD BE CENTRALLY ALIGNED WITH ROLLERS (J) ON TRANSFER PAWLS (1) AS TRANSFER SHAFT (12) ROTATES.

ADJ. TRANSFER SPACING WASHERS (A) ON LEFT END OF TRANSFER SHAFT (12). FORM LOWER ARM OF TRANSFER PAWLS (1) FOR INDIVIDUAL ADJUSTMENT.

9. WITH ACCUMULATOR IN NEUTRAL POSITION WITH RACKS, TRANSFER CAMS (16) (FIGURE 15) SHOULD DRIVE TRANSFER PAWLS (1) FROM CONDITIONED TO NORMAL POSITION AND WHEN HIGH POINT OF TRANSFER CAMS (16) IS ON ROLLERS (J) OF TRANSFER PAWLS (1), TRANSFER PAWLS SHOULD LOCK RACK GEARS FROM TURNING WITH .002" TO .010" PLAY.

ADJ. FORM LOWER ARM OF TRANSFER PAWLS (1) TO RAISE OR LOWER ROLLERS (J).

10. MACHINE NORMAL, UPPER STUD (B) (FIGURE 16) AND LOWER STUD (N) OF ACCUMULATOR POSITIONING CAM (4) SHOULD BE CENTRALLY LOCATED WITH SLOTS IN ACCUMULATOR POSITIONING LINK (2).

ADJ. LOOSEN LOCK NUT ON INSIDE LEFT SIDE FRAME AND TURN TOTAL CONTROL CAM FOLLOWER ECCENTRIC STUD (A) TO REPOSITION ACCUMULATOR POSITIONING LINK (2) FRONT AND REAR.

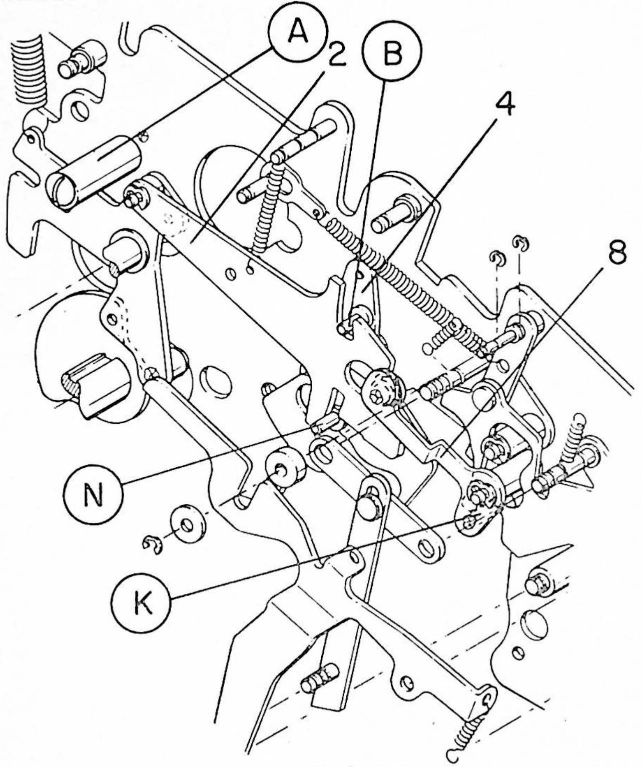


FIG. 16

11. WHEN NON-ADD KEY IS DEPRESSED, ACCUMULATOR POSITIONING LINK (2) (FIGURE 16) SHOULD BE CENTRALLY LOCATED BETWEEN UPPER STUD (B) AND LOWER STUD (N) OF ACCUMULATOR POSITIONING CAM (4). WHEN TOTAL, SUB-TOTAL OR SUBTRACT KEY IS DEPRESSED, ACCUMULATOR POSITIONING LINK (2) SHOULD BE LOWERED TO FULLY ENGAGE LOWER STUD (N) OF ACCUMULATOR POSITIONING CAM (4).

ADJ. FORM LOWER EXTENSION OF ACCUMULATOR POSITIONING CONTROL LEVER (8) TO MOVE STUD (K) TO FRONT OR REAR.

CAMS AND CAM FOLLOWERS

AS WAS PREVIOUSLY EXPLAINED, THIS TYPE MACHINE OPERATES ONE CYCLE THRU A FULL 360° OF TRAVEL. IN ORDER TO ACCOMPLISH THIS AND STILL NORMALIZE PARTS AT END OF CYCLE, VARIOUS CONTOURED CAMS USED IN DIRECT, FLEXIBLE RELATIONSHIP WITH THEIR RESPECTIVE CAM FOLLOWERS ARE NECESSARY.

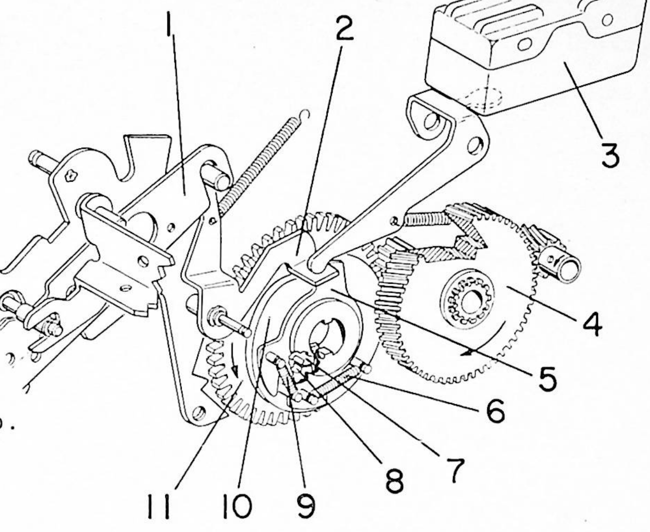


FIG. 1

PRIMARY CAMS ON MAIN CONTROL SHAFT ARE CLUTCH(10) (FIGURE 1) AND FREE-RUNNING CLUTCH GEAR (11). THRU THESE TWO CAMS, MOTIVATION IS IMPARTED MECHANICALLY FROM THE POWER SOURCE. AS CLUTCH CONTROL DOG (2) IS ACTUATED BY CLUTCH CONTROL BAR (1), TWO THINGS OCCUR. MOTOR MICRO-SWITCH (3) IS CLOSED AND CLUTCH PLATE (5) IS RELEASED. AS MICRO-SWITCH (3) STARTS MOTOR, THRU MOTOR DRIVE GEAR (4), CLUTCH GEAR STARTS ROTATING. AT SAME TIME, MICRO-SWITCH (3) CLOSES, CLUTCH PLATE (5) IS RELEASED, ALLOWING SPRINGS (6) AND (9) TO MESH CLUTCH PAWL (8) WITH CLUTCH GEAR (7). THIS LOCKS BOTH CAMS TOGETHER AND, SINCE CLUTCH (10) IS KEYED ON MAIN CONTROL SHAFT, TURNS MAIN CONTROL SHAFT. AT END OF 360° CYCLE, CLUTCH CONTROL DOG (2) DROPS OFF HIGH CONTOUR OF CLUTCH (10) AND ENGAGES CLUTCH PLATE (5) WHICH, IN TURN, CAMS CLUTCH PAWL (8) OUT OF MESH WITH CLUTCH GEAR (7) AND SIMULTANEOUSLY OPENS MICRO-SWITCH (3), BREAKING CIRCUIT AND STOPPING MOTOR. FREE-RUNNING CLUTCH GEAR (11) WILL THEN COAST THRU UNTIL MOTOR STOPS TURNING.

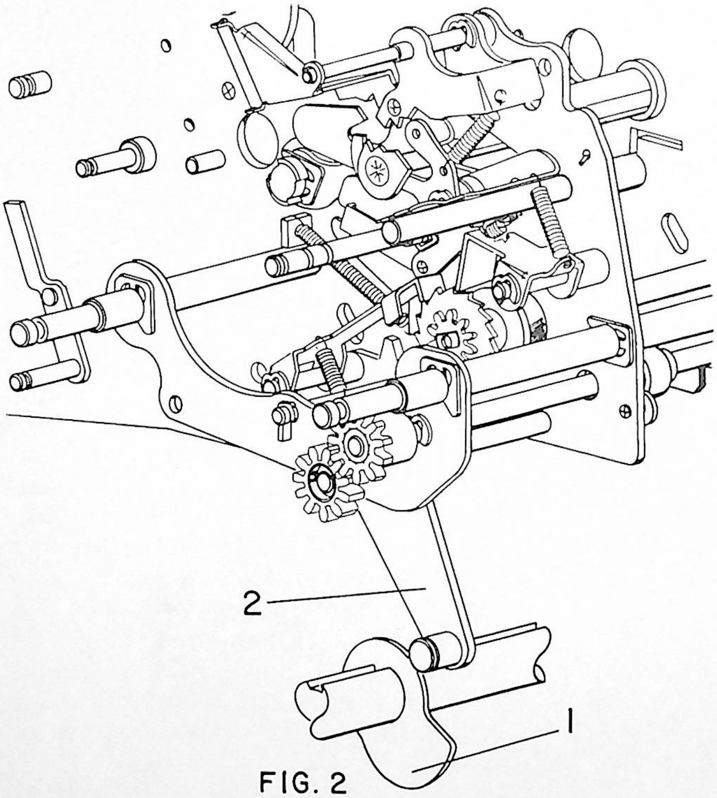


FIG. 2

CAM (1) (FIGURE 2), IMMEDIATELY TO RIGHT OF CLUTCH, IS RIBBON FEED AND PLATEN INDEXING CAM. CONTOUR OF CAM (1) IS SUCH THAT RIBBON FEED AND PLATEN INDEXING CAM FOLLOWER (2) WILL NOT ACTUATE UNTIL ABOUT 230° IN MAIN CONTROL SHAFT CYCLE. AT THAT TIME, HIGH CONTOUR OF CAM (1) WILL ROTATE RIBBON FEED AND PLATEN INDEXING CAM FOLLOWER (2) WHICH, IN TURN, WILL SPACE PLATEN AND FEED RIBBON.

THE NEXT CAM TO RIGHT IS TWO IDENTICAL CAMS ASSEMBLED TOGETHER. THE PURPOSE OF THIS IS TO PROVIDE A BROADER BEARING SURFACE FOR ROLL (A) (FIGURE 3) ON CAM FOLLOWER (3). THESE CAMS (4) ARE PRINTER CONTROL CAMS.

AT BETWEEN 180° AND 230°, PRINT OPERATION OCCURS WHEN ROLL (A) ON PRINTING CONTROL CAM FOLLOWER (3) DROPS INTO DWELL OF PRINTER CONTROL CAMS (4). THIS, THRU ARM (2) JOINED TO CAM FOLLOWER (3), ALLOWS PRINTER CONTROL SHAFT (1) TO ROTATE AND PRINTING LEVERS TO PRINT. AS HIGH CONTOUR OF CAM (4) CONTACTS ROLL (A) ON CAM FOLLOWER (3), PRINTING LEVERS AND PRINTER CONTROL SHAFT (1) RESTORE TO NORMAL POSITION.

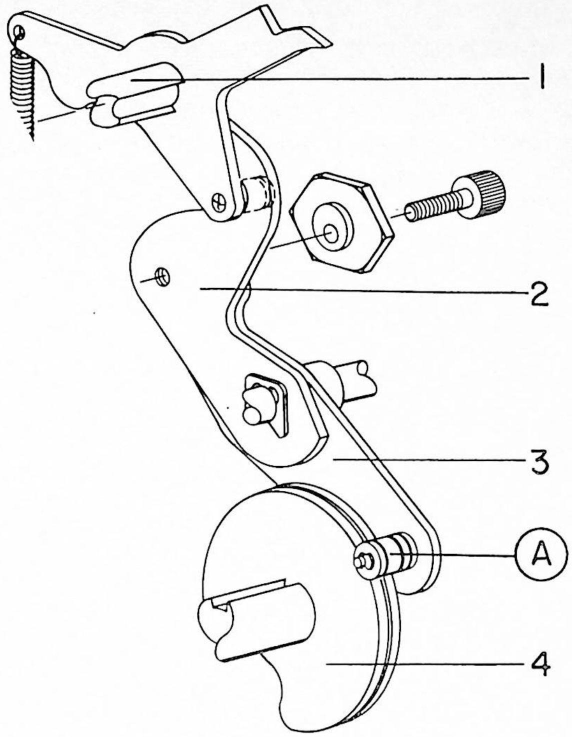


FIG. 3

THE CAM JUST INSIDE RIGHT SIDE FRAME IS AUTOMATIC KEY RELEASE CAM (2) (FIGURE 4). CAM (2), THRU CAM FOLLOWER (1), WILL CLEAR KEYBOARD FROM APPROXIMATELY 325° IN CYCLE UNTIL END OF CYCLE. HIGH PORTION OF CAM (2) WILL PICK UP ROLL (A) ON CAM FOLLOWER (1), ROTATING ITS TOP TO REAR, CLEARING KEYBOARD. AS ROLL (A) ON CAM FOLLOWER (1) DROPS OFF HIGH PORTION OF CAM (2), SPRING (4) ON FRONT OF CAM FOLLOWER LINK (3) WILL RETURN CAM FOLLOWER (1) AND LINK (3) TO NORMAL.

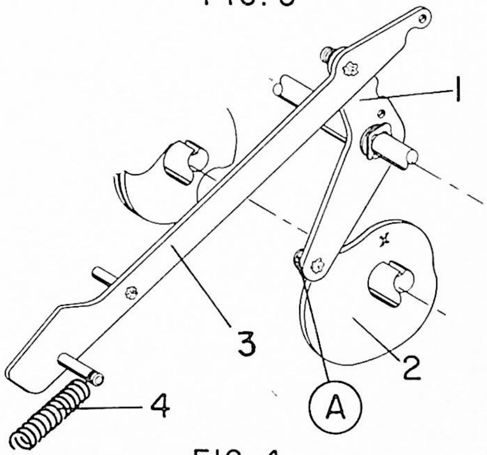


FIG. 4

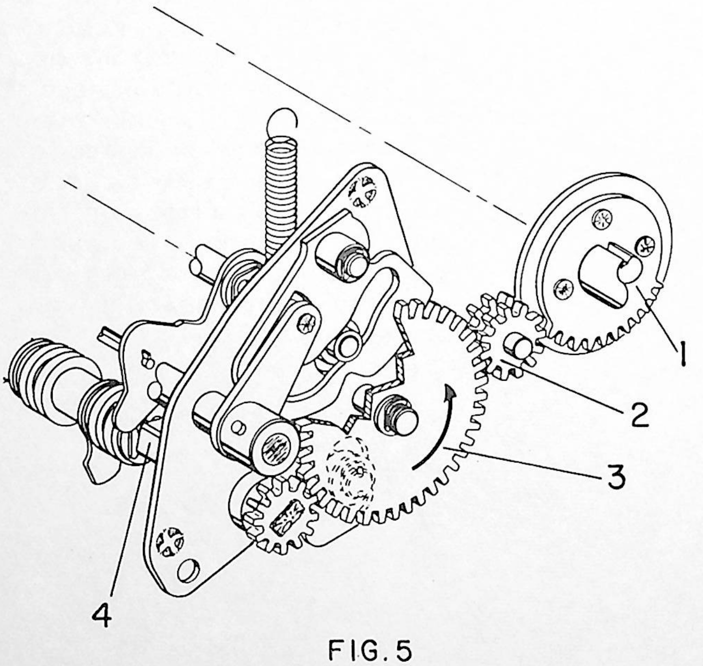


FIG. 5

ON OUTSIDE AND NEXT TO RIGHT SIDE FRAME IS A GENEVA GEAR (1) (FIG. 5). THIS GEAR IS SO CONSTRUCTED AS TO TURN 215° IN MAIN CONTROL SHAFT CYCLE BEFORE ENGAGING TRANSFER INTERMITTENT GEAR (2). AT THIS TIME, ACCUMULATOR IS CENTERED AFTER AN ADD OR SUBTRACT OPERATION AND INTERMITTENT GEAR (2), IDLER GEAR (3) AND TRANSFER SHAFT (4) WILL EFFECT A TRANSFER WAVE. THE GEAR TRAIN ALLOWS TRANSFER SHAFT (4) TO TURN A FULL 360° ON LAST THIRD OF TRAVEL OF MAIN CONTROL SHAFT.

NEXT TWO CAMS TO RIGHT WORK IN DIRECT RELATIONSHIP WITH EACH OTHER. THESE TWO CAMS ARE RACK DRIVE CAM (8) (FIGURE 6) AND RACK RETURN CAM (1). AT BEGINNING OF MAIN CONTROL SHAFT CYCLE, ACCUMULATOR IS POSITIONED AND RACKS ARE UNLOCKED. AT THIS TIME, APPROXIMATELY 35° IN CYCLE, RACK DRIVE CAM (8) WILL CONTACT FRONT ROLL (D) ON RACK CONTROL CAM FOLLOWER (2). HIGH CONTOUR WILL ROTATE CAM FOLLOWER (2) CLOCKWISE AND THRU LINK (9) RACKS ARE DRIVEN UNTIL STOPPED AT PROPER POSITION. THIS DRIVE CYCLE LASTS UNTIL ABOUT 150°, AT WHICH TIME, CONTOUR OF CAM (8) WILL HOLD CAM FOLLOWER (2) ROTATED. AT ABOUT 250° IN CYCLE, CAM (1) WILL CONTACT REAR ROLL (A) OF RACK CONTROL CAM FOLLOWER (2) AND ROTATE FOLLOWER COUNTER-CLOCKWISE. THIS, THRU LINK (9) WILL RESTORE RACKS TO NORMAL POSITION WHICH IS REACHED AT ABOUT 325°. AT THIS TIME, CONTOUR OF CAM (1) WILL HOLD CAM FOLLOWER UNTIL CAM (8) STARTS TO DRIVE IT ON NEXT OPERATION.

LIKE MAIN RACK CONTROL CAMS (1) AND (8), MAIN RACK LOCK CAMS (5) AND (6) ARE DIRECTLY RELATED TO RACK LOCK CAM FOLLOWER (3) AND TO EACH OTHER. JUST BEFORE RACKS START TO DRIVE (AT ABOUT 35°) HIGH SURFACE OF CAM (5) CONTACTS FRONT ROLL (C) ON RACK LOCK CAM FOLLOWER (3), ROCKING FOLLOWER CLOCKWISE, LOWERING MAIN RACK LOCK (10). THIS CONTOUR HOLDS RACKS UNLOCKED UNTIL 150°, AT WHICH TIME, HIGH SURFACE OF CAM (6) CONTACTS REAR ROLL (B) ON CAM FOLLOWER (3), ROTATING FOLLOWER COUNTER-CLOCKWISE AND LOCKING RACKS. HIGH SURFACE WILL HOLD RACK LOCK CAM FOLLOWER (3) UNTIL HIGH SURFACE OF CAM (5) CONTACTS FRONT ROLL (C) AGAIN AT ABOUT 230°, ROCKING FOLLOWER (3) CLOCKWISE AND UNLOCKING RACKS AT ABOUT 250°. HIGH CONTOUR HOLDS RACK LOCK CAM FOLLOWER (3) UNTIL 325° WHEN HIGH SURFACE OF CAM (6) CONTACTS REAR ROLL (B) AND ROTATES FOLLOWER (1) COUNTER-CLOCKWISE, LOCKING RACKS AND HOLDING THEM LOCKED UNTIL NEXT CYCLE OF MAIN CONTROL SHAFT.

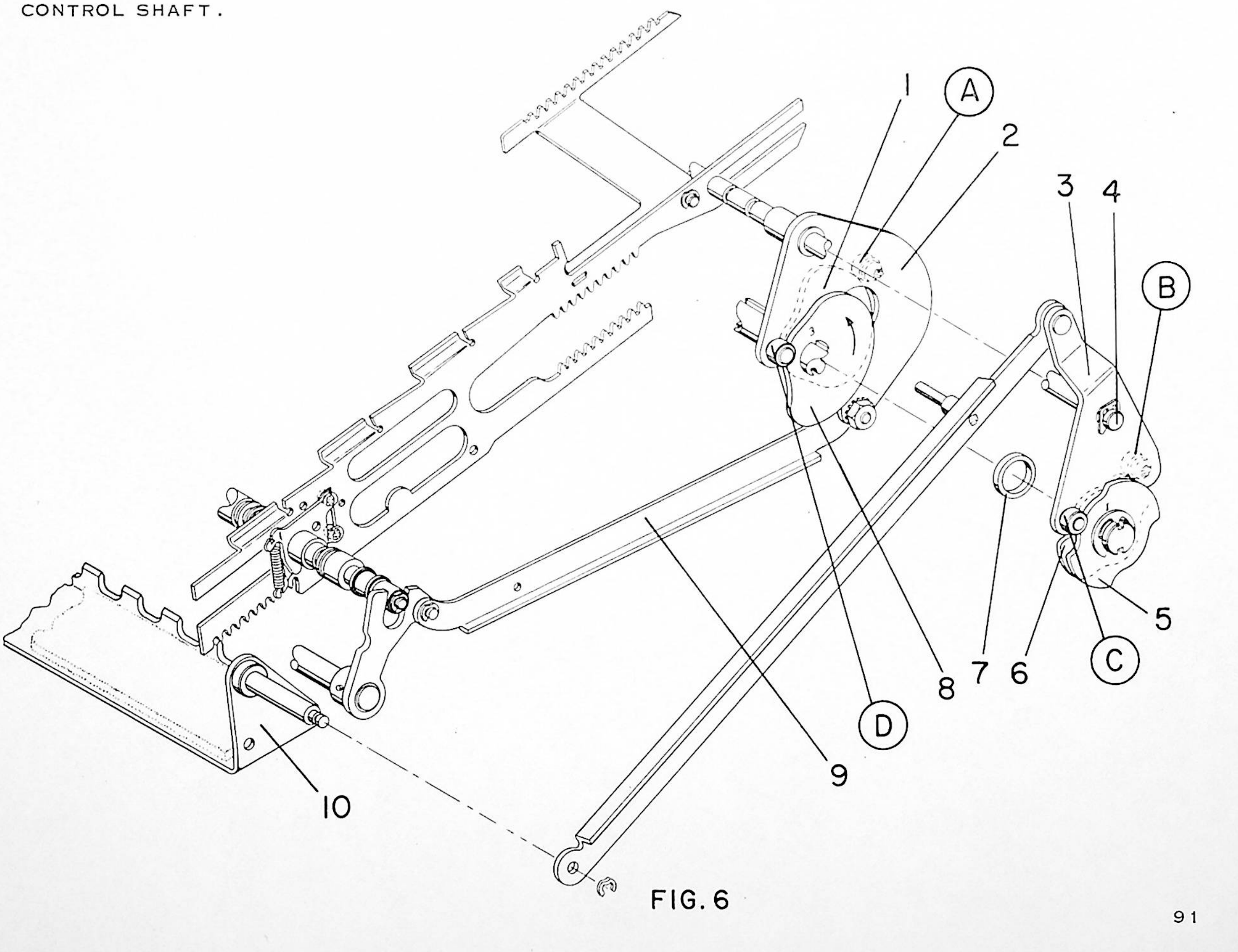


FIG. 6

IT SHOULD BE POINTED OUT AT THIS TIME THAT STUD (A) (FIGURE 7) ON RACK LOCK CAM FOLLOWER LINK (1) WILL ACTUATE CAM GEAR LINER BAIL (2) IN EXACTLY THE SAME WAY AND AT EXACTLY THE SAME TIME AS MAIN RACK LOCK. THIS ALLOWS CAM GEARS TO BE UNLOCKED SO WHEN RACKS MOVE, CAM GEARS CAN BE FREE TO TURN PRINTING DIALS TO PROPER POSITION.

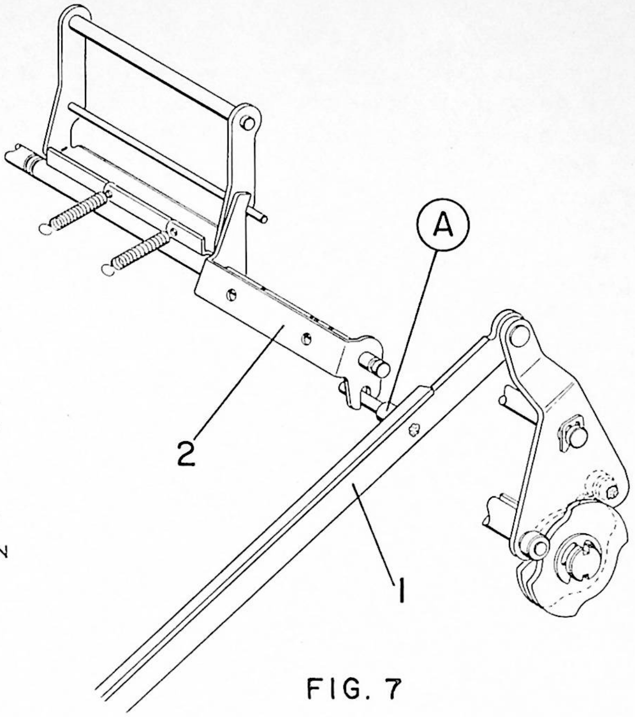


FIG. 7

TWO CAMS ON LEFT END OF MAIN CONTROL SHAFT (17) ARE SUB-TOTAL CAM (20) (FIGURE 8) AND TOTAL CAM (3) RESPECTIVELY. TOTAL CONTROL CAM FOLLOWER (2) ACTUATES ACCUMULATOR POSITIONING LINK (6) WHICH, WHEN POSITIONED ANY ONE OF THREE WAYS, CONTROLS ACCUMULATOR. CONTOUR OF TOTAL CAM (3) IS SUCH THAT CAM FOLLOWER (2) WILL SNAP OFF HIGH PORTION OF CAM AT 180° ALLOWING ACCUMULATOR TO CENTRALIZE.

SUB-TOTAL CAM FOLLOWER (21) WILL OPERATE ZERO STOP ACTUATING LINK (12) ON TOTAL AND SUB-TOTAL OPERATIONS, WHICH, IN TURN, OPERATES ACCUMULATOR ZERO STOP SHAFT (14) AND POWER KEY RELEASE (9). IF A SUB-TOTAL IS SELECTED, STUD (C) ON SUB-TOTAL LINK (16) WILL MOVE INTO SLOT ON SUB-TOTAL CAM FOLLOWER (21) AND TOTAL CONTROL CAM FOLLOWER (2) AND LOCK THE TWO CAM FOLLOWERS TOGETHER. FULL CONTOUR OF SUB-TOTAL CAM (20) WILL THEN PREVENT ACCUMULATOR FROM CENTRALIZING AT HALF-CYCLE AND AMOUNT EXTRACTED FROM RACK GEARS WILL BE RE-ENTERED.

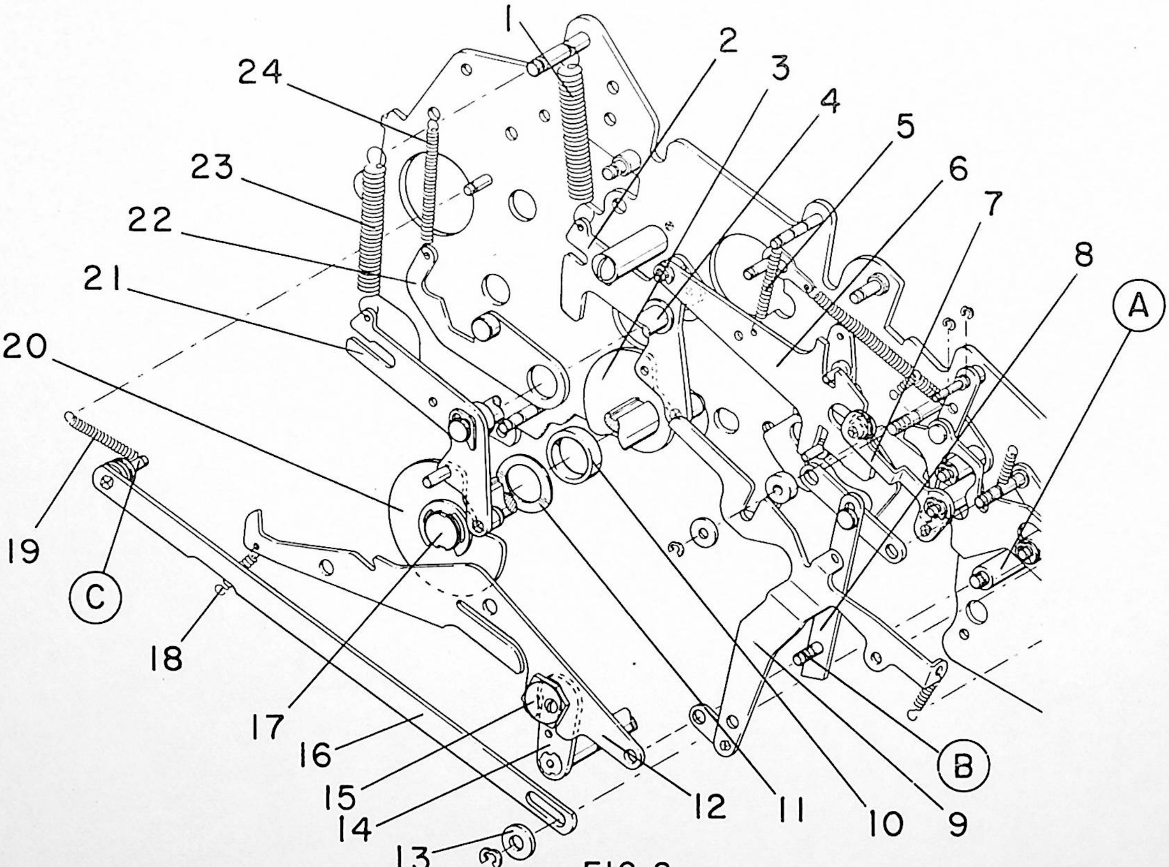


FIG. 8

REMOVAL OF CAM SHAFT AND CAM FOLLOWERS

REMOVE KEYBOARD.

REMOVE PRINTER.

REMOVE MAIN RACKS AND DRIVE MECHANISM.

LEFT SIDE:

REMOVE SUB-TOTAL LINK (16) (FIGURE 8) BY UNHOOKING SPRING (19) FROM REAR END OF LINK AND REMOVING KEEPER AND SPACER (13) FROM FRONT END OF LINK.

REMOVE ZERO STOP ACTUATING LINK (12) BY UNHOOKING SPRING (18) FROM REAR END OF LINK AND DISENGAGING IT FROM STUD (B) IN LOWER END OF ZERO STOP LINK CONNECTOR (8) AND DISENGAGING FORK FROM ZERO STOP SHAFT ECCENTRIC (15).

UNHOOK SPRINGS (23), (24) AND (1) FOR SUB-TOTAL CONTROL CAM FOLLOWER (21), SUB-TOTAL LINK LATCH (22) AND TOTAL CONTROL CAM FOLLOWER (2).

REMOVE ACCUMULATOR POSITIONING LINK (6) BY REMOVING KEEPER AND UNHOOKING SPRING (5).

REMOVE KEEPER FROM LEFT END OF RACK AND CAM FOLLOWER SUPPORT SHAFT (4) AND REMOVE SUB-TOTAL CONTROL CAM FOLLOWER (21) AND SUB-TOTAL LINK LATCH (22).

REMOVE KEEPER FROM LEFT END OF CAM SHAFT (17) AND REMOVE SUB-TOTAL CONTROL CAM (20), TENSION WASHER (11) AND SPACER (10).

REMOVE TOTAL CONTROL CAM FOLLOWER (2).

REMOVE TOTAL CONTROL CAM (3).

NOTE: AT THIS POINT, RESTORE CAM SHAFT (17) TO NORMAL.

REMOVE TWO SCREWS FROM OUTSIDE LEFT FRAME FOR CAM SHAFT BEARING PLATE.

RIGHT SIDE:

REMOVE KEEPER FROM RIGHT END OF CAM SHAFT AND REMOVE MAIN RACK LOCK CONTROL DRIVE CAM (5) (FIGURE 6) AND SPACER.

REMOVE MAIN RACK LOCK CONTROL CAM FOLLOWER (3) BY REMOVING KEEPER FROM RIGHT END OF RACK AND CAM FOLLOWER SHAFT (4).

REMOVE MAIN RACK LOCK CONTROL RETURN CAM (6), TENSION WASHER, MAIN RACK CONTROL DRIVE CAM (8) AND SPACER FROM CAM SHAFT.

REMOVE MAIN RACK CONTROL CAM FOLLOWER (2) FROM RACK AND CAM FOLLOWER SUPPORT SHAFT (4).

REMOVE MAIN RACK CONTROL RETURN CAM (1) AND SPACER FROM CAM SHAFT.

REMOVE GENEVA GEAR (1) (FIGURE 5) AND TRANSFER INTERMITTENT GEAR (2). (THESE PARTS WILL HAVE TO BE REMOVED TOGETHER.)

REMOVE TWO SCREWS FROM INSIDE RIGHT FRAME FOR CAM SHAFT BEARING PLATE.

REMOVE CAM SHAFT AS A UNIT.

REMOVE KEEPERS FROM RACK AND CAM FOLLOWER SUPPORT SHAFT (4) (FIGURE 9). (NOTE POSITION OF CAM FOLLOWERS ON SHAFT).

REMOVE OFFSET RACK GUIDE COMB.

LOOSEN SCREW IN RACK AND CAM FOLLOWER SHAFT SUPPORT (5) (FIGURE 9). PULL RACK AND CAM FOLLOWER SHAFT TO RIGHT AND REMOVE CAM FOLLOWERS.

REPLACING CAM SHAFT AND CAM FOLLOWERS

INSERT RACK AND CAM FOLLOWER SHAFT (4) (FIGURE 9) THRU RIGHT SIDE FRAME AND ON THRU LEFT SIDE FRAME WHILE INSTALLING CAM FOLLOWERS IN THE FOLLOWING ORDER:

A. AUTOMATIC KEY RELEASE CAM FOLLOWER (1) (FIG. 9) WITH HUB TO LEFT AND AUTOMATIC KEY RELEASE LINK TOWARD FRONT.

B. PRINTER CONTROL CAM FOLLOWER (3) WITH HUB TO RIGHT.

C. PLATEN INDEXING AND RIBBON FEED CAM FOLLOWER (2) WITH HUB TO LEFT.

INSTALL KEEPER IN SECOND SLOT FROM RIGHT END OF RACK AND CAM FOLLOWER SHAFT (4) LOCATED JUST INSIDE RIGHT SIDE FRAME.

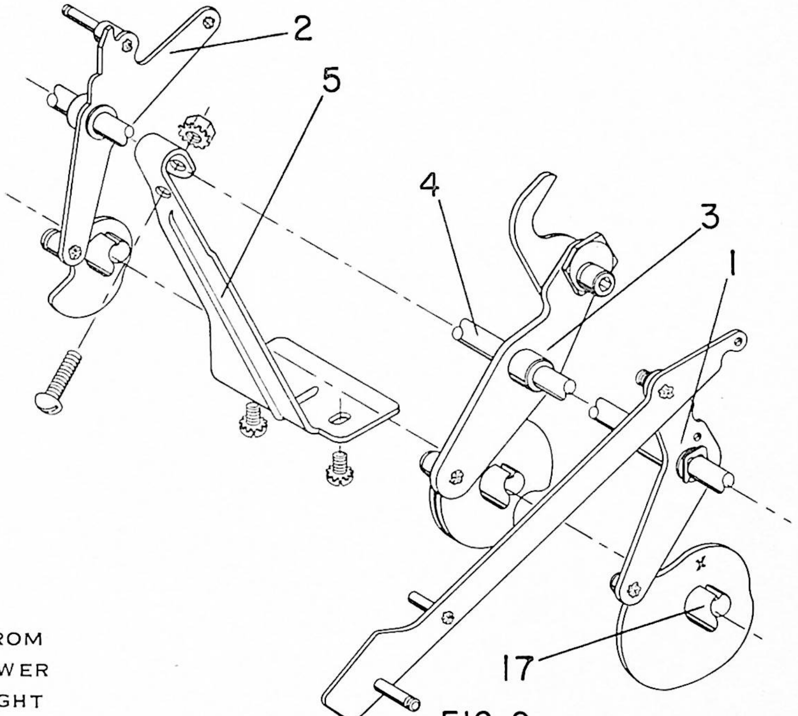


FIG. 9

POSITION AUTOMATIC KEY RELEASE CAM FOLLOWER (1) BETWEEN THIRD AND FOURTH SLOTS FROM RIGHT END OF SHAFT (4) AND INSTALL KEEPERS.

POSITION PRINTER CONTROL CAM FOLLOWER (3) BETWEEN SIXTH AND SEVENTH SLOTS FROM RIGHT END OF SHAFT (4) AND INSTALL KEEPERS.

POSITION PLATEN INDEXING AND RIBBON FEED CAM FOLLOWER (2) JUST TO RIGHT OF SIXTEENTH SLOT FROM RIGHT END OF SHAFT (4). INSTALL KEEPER IN SLOT.

INSTALL KEEPER IN TWENTY-THIRD SLOT FROM RIGHT END OF SHAFT (4) LOCATED JUST INSIDE LEFT SIDE FRAME.

TIGHTEN SCREW IN RACK AND CAM FOLLOWER SHAFT SUPPORT (5).

REPLACE CAM SHAFT (17) AND, WHEN DOING SO, POSITION ROLLS ON AUTOMATIC KEY RELEASE CAM FOLLOWER (1), PRINTER CONTROL CAM FOLLOWER (3) AND PLATEN INDEXING AND RIBBON FEED CONTROL CAM FOLLOWER (2) TO THE FRONT OF THEIR RESPECTIVE CAMS. ALSO, WHEN REPLACING CAM SHAFT (17), LOCATE RIGHT CAM SHAFT BEARING PLATE INSIDE RIGHT SIDE FRAME AND LEFT BEARING PLATE OUTSIDE LEFT SIDE FRAME. PLACE PROTRUSIONS ON PLATES IN HOLES IN FRAMES AND REPLACE FOUR SCREWS.

REPLACE GENEVA GEAR (1)(FIGURE 5) AND TRANSFER INTERMITTENT GEAR (2) TOGETHER.

NOTE: GEAR PORTION OF GENEVA GEAR (1) WILL BE TO THE OUTSIDE AND IN A DOWNWARD POSITION WHILE WIDE GEAR PORTION OF INTERMITTENT GEAR (2) WILL BE TO THE INSIDE AND CUT-OUT TO THE REAR.

REPLACE SPACER AND MAIN RACK CONTROL RETURN CAM (1)(FIGURE 6) ON CAM SHAFT.

NOTE: NUMBER ON CAM (1) SHOULD BE UP AND TO THE OUTSIDE.

REPLACE MAIN RACK CONTROL CAM FOLLOWER (2) ON RACK AND CAM FOLLOWER SUPPORT SHAFT (4).

REPLACE SPACER AND MAIN RACK CONTROL DRIVE CAM (8) ON CAM SHAFT.

NOTE: NUMBER ON CAM (8) SHOULD BE UP AND TO THE OUTSIDE.

REPLACE TENSION WASHER AND MAIN RACK LOCK CONTROL RETURN CAM (6) ON CAM SHAFT.

NOTE: NUMBER ON CAM (6) SHOULD BE UP AND TO THE OUTSIDE.

REPLACE MAIN RACK LOCK CONTROL CAM FOLLOWER (3) ON RACK AND CAM FOLLOWER SHAFT (4). REPLACE KEEPER.

REPLACE SPACER, MAIN RACK LOCK CONTROL DRIVE CAM (5) AND KEEPER ON CAM SHAFT.

NOTE: NUMBER ON CAM (5) SHOULD BE UP AND TO THE OUTSIDE.

REPLACE TOTAL CONTROL CAM (3) ON LEFT END OF CAM SHAFT (17)(FIGURE 8).

NOTE: LETTER "T" ON CAM (3) SHOULD BE UP AND TO THE OUTSIDE.

REPLACE TOTAL CONTROL CAM FOLLOWER (2) AND REHOOK SPRING (1).

REPLACE SPACER (10), TENSION WASHER (11), SUB-TOTAL CONTROL CAM (20) AND KEEPER ON LEFT END OF CAM SHAFT (17).

NOTE: DWELL ON CAM (20) SHOULD BE UP AND TO THE FRONT.

REPLACE SUB-TOTAL CONTROL CAM FOLLOWER (21) AND SUB-TOTAL LINK LATCH (22). REPLACE KEEPER ON RACK AND CAM FOLLOWER SUPPORT SHAFT (4).

REPLACE ACCUMULATOR POSITIONING LINK (6), ENGAGING FORK AT FRONT OF LINK WITH STUD IN ACCUMULATOR POSITIONING LEVER (7).

NOTE: LONGEST PORTION OF FORK SHOULD BE AT BOTTOM. MOUNT LINK (6) ON STUD IN TOTAL CONTROL CAM FOLLOWER (2) WITH KEEPER AND REHOOK SPRING (5) TO STUD IN FRAME.

REPLACE ZERO STOP ACTUATING LINK (12) ENGAGING FRONT END OF LINK WITH STUD (B) IN ZERO STOP LINK CONNECTOR (8) AND ENGAGING FORK WITH ZERO STOP SHAFT ECCENTRIC (15). REHOOK SPRING (18) TO STUD IN LEFT SIDE FRAME.

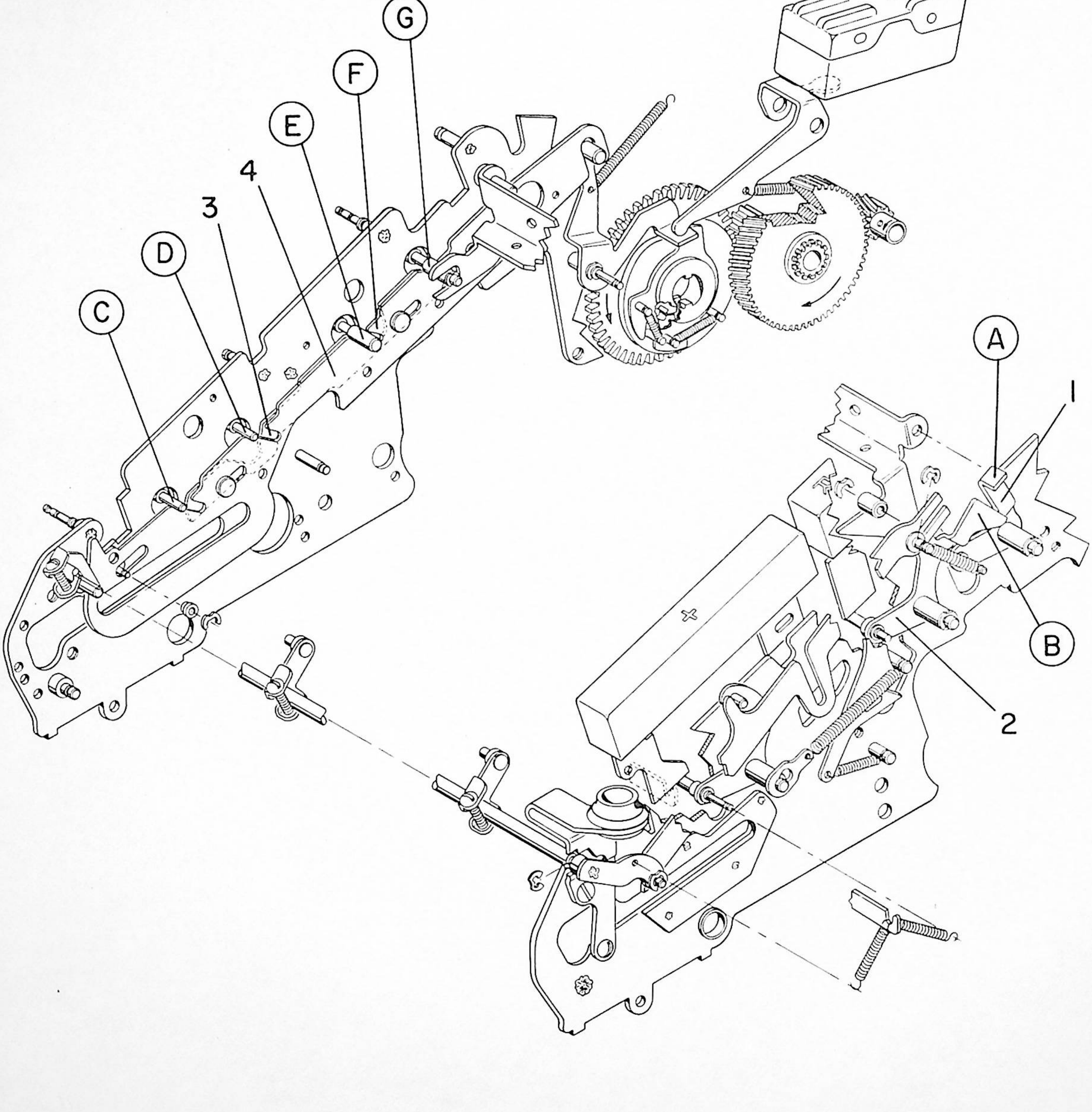
REPLACE SUB-TOTAL LINK (16), ENGAGING SLOT IN STUD (C) AT REAR OF LINK WITH SLOT IN SUB-TOTAL CONTROL CAM FOLLOWER (21). MOUNT FRONT END OF LINK ON STUD (A) WITH SPACER (13) AND KEEPER. REHOOK SPRING (19) AT REAR OF LINK.

REHOOK SUB-TOTAL LINK LATCH SPRING (24) AND SUB-TOTAL CONTROL CAM FOLLOWER SPRING (23).

REPLACE MAIN RACKS AND DRIVE MECHANISM.

REPLACE PRINTER.

REPLACE KEYBOARD.


G
F
E
4
3
D
C
A
1
B
2

INTERLOCKS

THERE ARE INTERLOCKS PROVIDED BETWEEN VARIOUS CONTROL KEYS TO PREVENT MIS-OPERATIONS. THESE INTERLOCKS ARE BETWEEN RIGHT TOTAL AND REPEAT KEY, NON-ADD AND MINUS KEY AND TOTAL AND SUB-TOTAL KEY.

BETWEEN RIGHT TOTAL AND REPEAT KEYS, INTERLOCK IS PERFORMED BY TWO SEPARATE SURFACES. AS REPEAT KEY IS DEPRESSED, REPEAT KEY ACTUATED BELLCRANK (2) (PLATE 20) IS ROTATED COUNTERCLOCKWISE. REAR EXTENSION (B) ON BELLCRANK (2) WILL PASS UNDER FRONT EDGE OF EAR (A) ON TOTAL KEY ACTUATED BELLCRANK (1). IF TOTAL KEY IS DEPRESSED AT THIS TIME, FORWARD EDGE OF EAR (A) WOULD LIMIT ON EXTENSION (B) ON REPEAT KEY ACTUATED BELLCRANK (2), PREVENTING TOTAL KEY ACTUATED BELLCRANK (1) FROM ROCKING.

IF TOTAL KEY IS DEPRESSED FIRST, EAR (A) ON TOTAL KEY ACTUATED BELLCRANK (1) WILL PASS OVER EXTENSION (B) OF REPEAT KEY ACTUATED BELLCRANK (2). IF REPEAT KEY WERE DEPRESSED, EXTENSION (B) ON REPEAT KEY ACTUATED BELLCRANK (2) WOULD LIMIT ON UNDERSIDE OF EAR (A) OF TOTAL KEY ACTUATED BELLCRANK (1), PREVENTING REPEAT KEY ACTUATED BELLCRANK (2) FROM ROTATING.

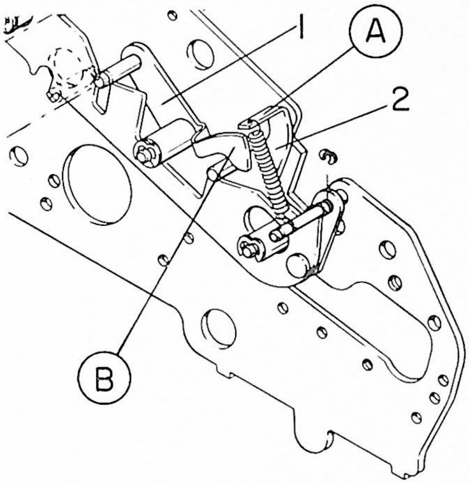


FIG. 10

BETWEEN NON-ADD AND SUBTRACT KEYS, AN IDENTICAL INTERLOCK IS CONSTRUCTED. EXTENSION (B) (FIGURE 10) ON NON-ADD KEY ACTUATED BELLCRANK (1) AND EAR (A) ON SUBTRACT KEY ACTUATED BELLCRANK (2) OPERATE IN EXACTLY THE SAME MANNER AS INTERLOCK BETWEEN RIGHT TOTAL KEY AND REPEAT KEY.

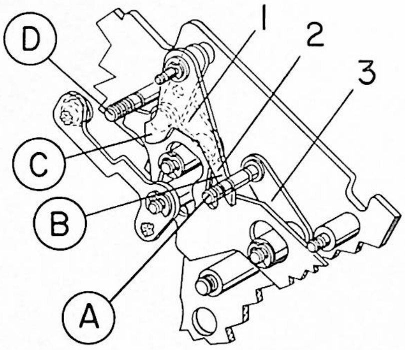


FIG. 11

AN INTERLOCK IS PROVIDED BETWEEN LEFT TOTAL KEY AND SUB-TOTAL KEY TO PREVENT SIMULTANEOUS DEPRESSION OF KEYS. THIS IS ACCOMPLISHED BY TOTAL AND SUB-TOTAL INTERLOCK (2) (FIGURE 11) LOCATED BETWEEN OUTER STUDS (A) AND (D) ON KEY ACTUATED BELLCRANKS (1) AND (3). IF SUB-TOTAL KEY IS DEPRESSED, SUB-TOTAL KEY ACTUATED BELLCRANK (3) WILL BE ROTATED. THRU OUTER STUD (A) ON BELLCRANK (3), TOTAL AND SUB-TOTAL INTERLOCK (2) WILL BE ROTATED, POSITIONING EXTENSION (C) UNDER OUTER STUD (D) OF TOTAL KEY ACTUATED BELLCRANK (1), THUS BLOCKING DEPRESSION OF TOTAL KEY. IF TOTAL KEY IS DEPRESSED, TOTAL KEY ACTUATED BELLCRANK WILL BE ROTATED. THRU OUTER STUD (D) ON BELLCRANK (1), TOTAL AND SUB-TOTAL KEY INTERLOCK (2) WILL BE ROTATED, POSITIONING EXTENSION (B) UNDER OUTER STUD (A) OF SUB-TOTAL KEY ACTUATED BELLCRANK (3), THUS BLOCKING DEPRESSION OF SUB-TOTAL KEY.

MOUNTED ON CLUTCH CONTROL BAR (4) (PLATE 20) IS A SECONDARY INTERLOCK SLIDE (3) TO BLOCK SIMULTANEOUS DEPRESSION OF SUB-TOTAL KEY OR TOTAL KEY WHEN EITHER NON-ADD OR SUBTRACT KEY IS PARTIALLY DEPRESSED. THIS IS ACCOMPLISHED IN THE FOLLOWING MANNER: NON-ADD KEY OR SUBTRACT KEY DEPRESSED, INNER STUD (C) OR (D) ON NON-ADD KEY ACTUATED BELLCRANK OR SUBTRACT KEY ACTUATED BELLCRANK WILL CAM INTERLOCK SLIDE (3) REARWARD, POSITIONING SLIDE IN PATH OF STUDS (E) OR (G) ON SUB-TOTAL KEY ACTUATED BELLCRANK AND TOTAL KEY ACTUATED BELLCRANK, PREVENTING DEPRESSION OF SUB-TOTAL KEY OR TOTAL KEY.

TOTAL KEY OR SUB-TOTAL KEY DEPRESSED, INNER STUD (E) OR (G) ON TOTAL KEY ACTUATED BELLCRANK OR SUB-TOTAL KEY ACTUATED BELLCRANK WILL HOLD INTERLOCK SLIDE (3) FORWARD, KEEPING SLIDE IN PATH OF STUDS (C) AND (D) ON NON-ADD KEY ACTUATED BELLCRANK AND SUBTRACT KEY ACTUATED BELLCRANK, PREVENTING DEPRESSION OF NON-ADD KEY OR SUBTRACT KEY.

CLUTCH CONTROL BAR (4) (PLATE 20) PROVIDES A FULL CYCLE INTERLOCK WHEN ANY ONE CONTROL KEY IS DEPRESSED. THIS IS DUE TO SLANTED SLOTS IN BAR (4). THIS CAMS BAR (4) FORWARD WITH ANY CONTROL KEY FULLY DEPRESSED AND EXTENSIONS (F) WILL MOVE UNDER ALL OTHER STUDS. THIS EFFECTIVELY TRAPS DESIRED STUD FOR FULL CYCLE AND, AT SAME TIME, BLOCKS OTHER KEYS FROM BEING DEPRESSED.

POWER TRIP

POWER TRIP WAS DESIGNED TO LIGHTEN PRESSURE REQUIRED TO DEPRESS CONTROL KEYS ON MACHINES EQUIPPED WITH CREDIT BALANCE. AS OPPOSED TO MACHINES WITHOUT THIS FEATURE, CONTROL KEYS ON MACHINES WITH POWER TRIP, THROUGH THEIR BELLCRANKS OR LINKS, MOVE ONLY THE CLUTCH CONTROL BAR. THE POWER TRIP SLIDE (1)(FIGURE 12), WHICH IS SPRING-DRIVEN, ACTUATES ALL OTHER MECHANISMS REQUIRED TO PERFORM A DESIGNATED OPERATION.

AS A CONTROL KEY IS DEPRESSED, CLUTCH CONTROL BAR (5) IS ACTUATED TOWARD FRONT OF MACHINE. LIVE TIP (4), ENGAGED WITH STUD (C) ON POWER TRIP LATCH (3), ROTATES POWER TRIP LATCH (3) DOWNWARD, AWAY FROM ROLLER (B) ON POWER TRIP SLIDE (1). POWER TRIP SLIDE (1) WILL BE DRIVEN FORWARD THROUGH SPRING (2), ALLOWING LOWER EXTENSION (E) TO CONTACT STUD (F) ON CLUTCH CONTROL DOG (8). CLUTCH CONTROL DOG (8) WILL RELEASE 360° CLUTCH (9) AND ACTUATE SWITCH OPERATING LEVER (10) TO START MACHINE CYCLE.

NEAR END OF FIRST HALF OF MACHINE CYCLE, HIGH CONTOUR OF SUB-TOTAL CAM (7) WILL ROTATE SUB-TOTAL CAM FOLLOWER (12) COUNTER-CLOCKWISE. STUD (D) ON TOP OF CAM FOLLOWER WILL CONTACT EXTENSION (A) ON POWER TRIP SLIDE (1), DRIVING IT REARWARD. RESTORE SPRING (6) FOR POWER TRIP LATCH (3) WILL RESTORE LATCH (3) TO BLOCK SLIDE (1) FROM DRIVING FORWARD AGAIN. AT THIS TIME, CLUTCH CONTROL BAR (5) WILL RESTORE, ALLOWING THE CONTROL KEY TO RESTORE. HOWEVER, MOTOR WILL CONTINUE TO OPERATE, DUE TO CLUTCH CONTROL DOG (8) BEING TRAPPED BY HIGH CONTOUR OF 360° CLUTCH. AT END OF CYCLE, CLUTCH CONTROL DOG (8) AND SWITCH OPERATING LEVER (10) WILL RESTORE, OPENING MICRO-SWITCH (11) AND DISENGAGING CLUTCH TO STOP MACHINE CYCLE.

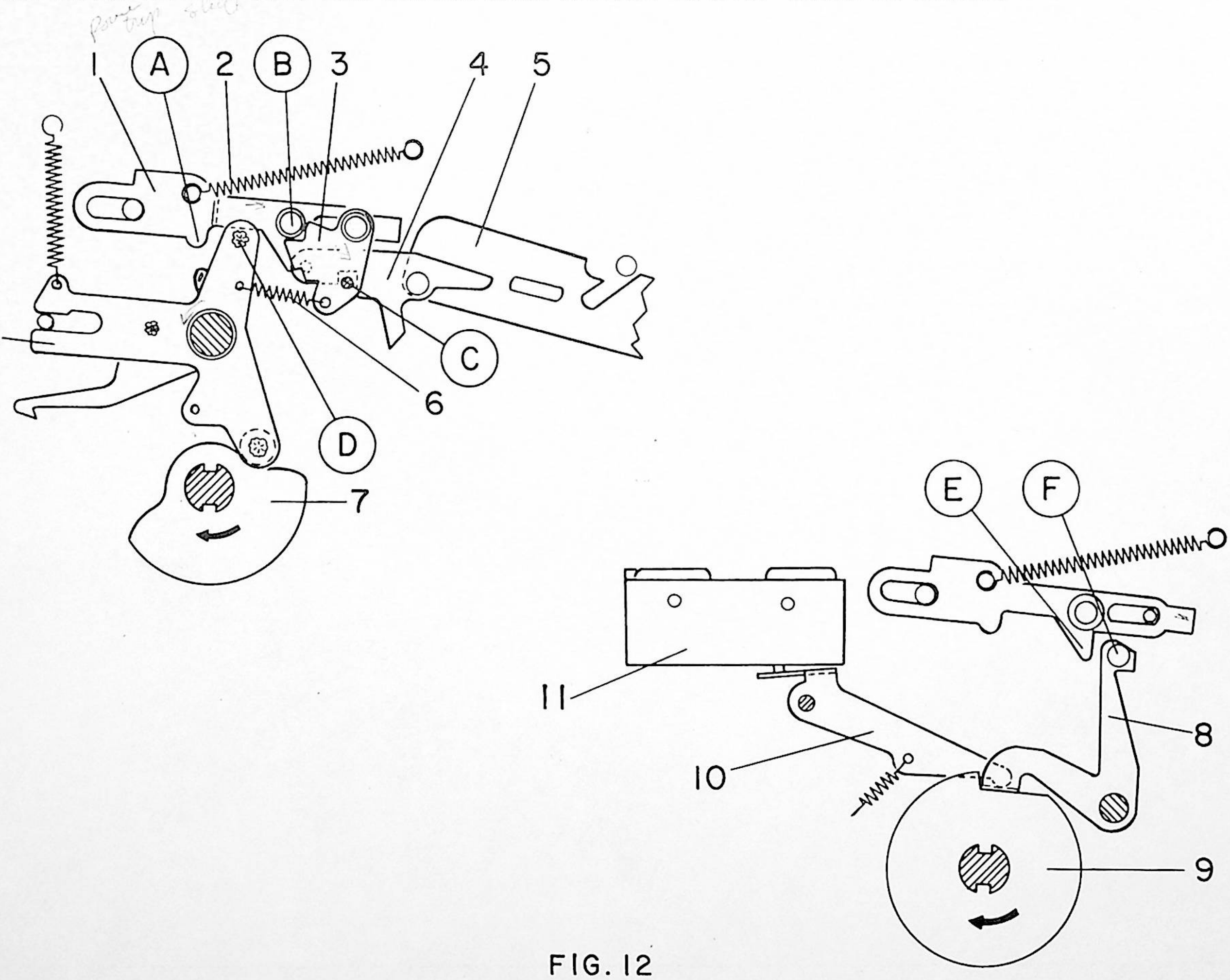


FIG. 12

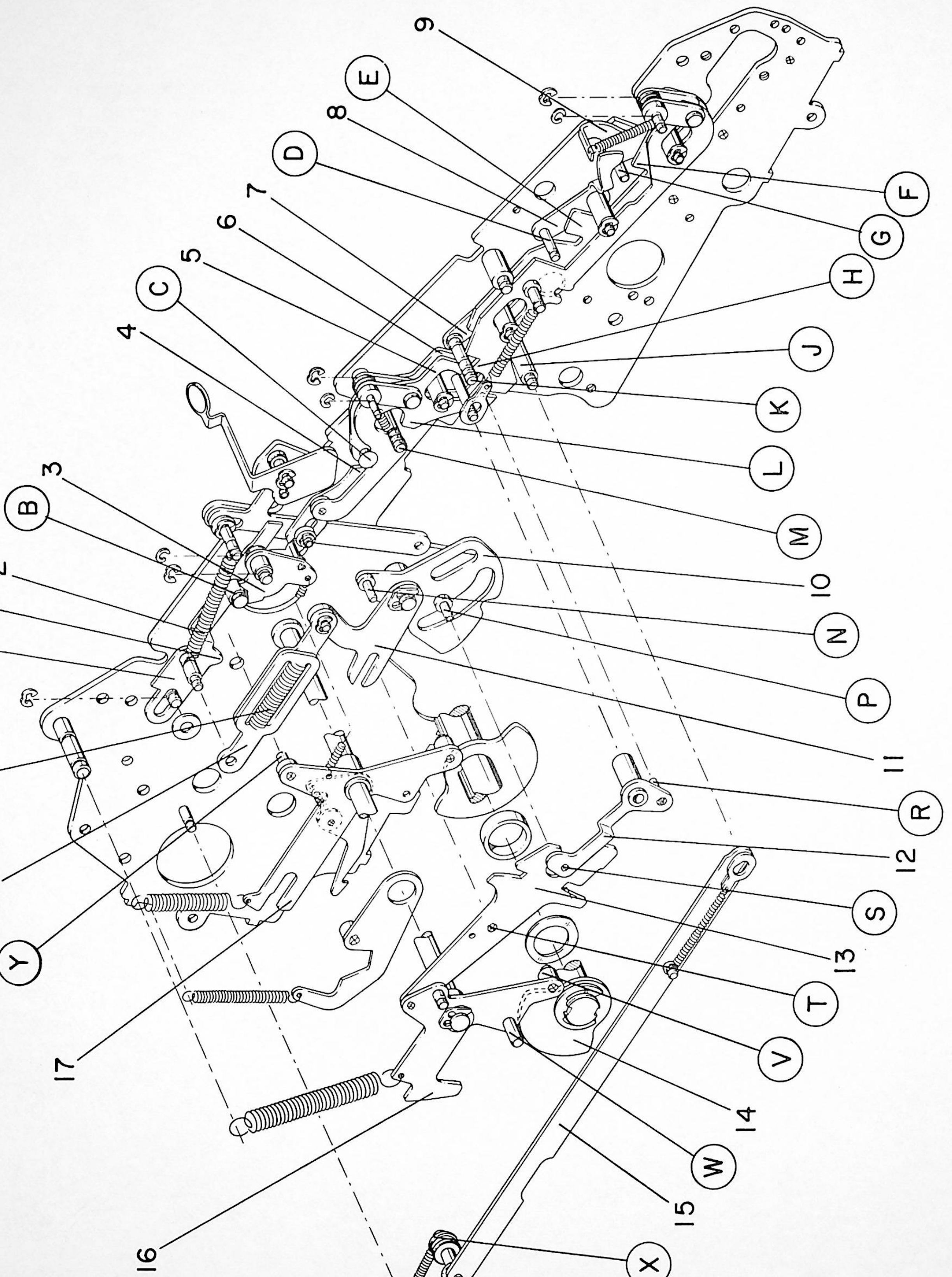


PLATE 21 ACCUMULATOR POSITIONING

ACCUMULATOR POSITIONING MECHANISM

THE ACCUMULATOR POSITIONING MECHANISM CONSISTS OF ACCUMULATOR POSITIONING YIELD (18) (PLATE 21) MOUNTED ON POWER TRIP SLIDE (1) AND ACCUMULATOR CONTROL ARM (11) WHICH IS MOUNTED ON ACCUMULATOR POSITIONING CAM (10) WITH FORK IN ARM ENGAGED WITH STUD (T) ON ACCUMULATOR POSITIONING LINK (13) AND ACCUMULATOR POSITIONING CONTROL LEVER (12) MOUNTED ON STUD IN LEFT FRAME WITH STUD (R) ENGAGED WITH ACCUMULATOR POSITIONING BAR, INNER (6) AND STUD (S) ENGAGED WITH SLOT IN ACCUMULATOR POSITIONING LINK (13).

THE ACCUMULATOR POSITIONING LINK (13) IS NORMALLY ENGAGED WITH LOWER STUD (P) ON ACCUMULATOR POSITIONING CAM (10)(MINUS POSITION). ACCUMULATOR POSITIONING LINK (13) WILL REMAIN ENGAGED WITH LOWER STUD (P) IN ACCUMULATOR POSITIONING CAM (10) ON MINUS, POSITIVE TOTAL AND POSITIVE SUB-TOTAL OPERATIONS. ACCUMULATOR POSITIONING LINK (13) WILL ENGAGE UPPER STUD (N) IN ACCUMULATOR POSITIONING CAM (10) ON ADD, TOTAL CREDIT AND SUB-TOTAL CREDIT OPERATIONS. ON NON-ADD OPERATION, ACCUMULATOR POSITIONING LINK (13) WILL BE CENTERED BETWEEN STUDS (N) AND (P) ON ACCUMULATOR POSITIONING CAM (10).

ADD AND REPEAT KEY OPERATION

WHEN ADD KEY OR REPEAT KEY IS DEPRESSED, CLUTCH CONTROL BAR (5)(FIGURE 12) WILL BE MOVED FORWARD. LIVE TIP (4), ENGAGED WITH STUD (C) ON POWER TRIP LATCH (3), ROTATES LATCH (3) DOWNWARD, AWAY FROM ROLLER (B) ON POWER TRIP SLIDE (1). POWER TRIP SLIDE (1) WILL BE DRIVEN FORWARD THRU SPRING (2). THIS, IN TURN, WILL DRIVE ACCUMULATOR POSITIONING YIELD (18)(PLATE 21) FORWARD, AND, THRU YIELD SPRING (19), ROTATES ACCUMULATOR CONTROL ARM (11) CLOCKWISE. FORK IN ACCUMULATOR CONTROL ARM (11) ENGAGED WITH STUD (T) IN ACCUMULATOR POSITIONING LINK (13), RAISES LINK TO ENGAGE UPPER STUD (N) IN ACCUMULATOR POSITIONING CAM (10).

AS ACCUMULATOR POSITIONING LINK (13) RAISES, IT WILL ROTATE ACCUMULATOR POSITIONING LEVER (12) WHICH ALLOWS ACCUMULATOR POSITIONING BAR (6) AND ACCUMULATOR AUXILIARY POSITIONING BAR (5) TO MOVE REARWARD. ACCUMULATOR AUXILIARY POSITIONING BAR (5) WILL ROTATE SYMBOL STOP BELLCRANK (1)(FIGURE 13) UNTIL IT LIMITS ON STUD (A) IN SYMBOL CONTROL RACK (2). THIS LIMITS THE REARWARD TRAVEL OF ACCUMULATOR AUXILIARY POSITIONING BAR (5)(PLATE 21) AND, THRU BLOCKING DOG (4) IN PATH OF STUD (C) ON ACCUMULATOR POSITIONING BAR (6), LIMITS REARWARD TRAVEL OF BAR (6).

AS MAIN CONTROL SHAFT STARTS ITS CYCLE, TOTAL CAM (14) WILL CONTACT ROLL (V) ON TOTAL CONTROL CAM FOLLOWER (16), ROTATING IT COUNTERCLOCKWISE. THIS WILL DRIVE ACCUMULATOR POSITIONING LINK (13) REARWARD, POSITIONING ACCUMULATOR RACK GEARS IN MESH WITH UPPER PORTION OF RACKS.

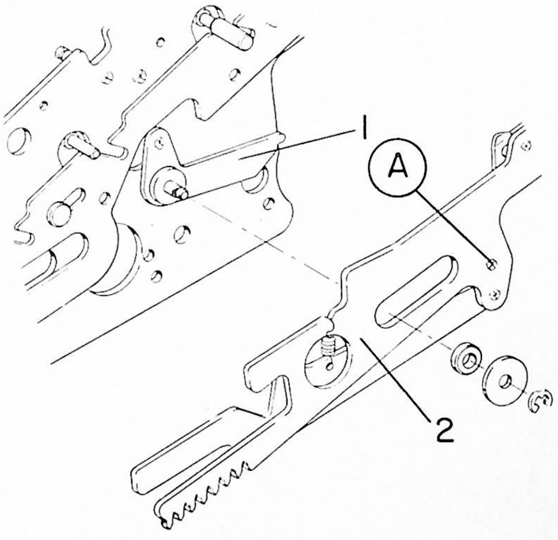


FIG. 13

AT APPROXIMATELY HALF-CYCLE, STUD (Y) ON SUB-TOTAL CONTROL CAM FOLLOWER (17) CONTACTS EXTENSION (A) ON POWER TRIP SLIDE (1), DRIVING SLIDE (1) REARWARD. THIS WILL PERMIT YIELD SPRING (19) TO RESTORE ACCUMULATOR POSITIONING LINK (13), ACCUMULATOR CONTROL ARM (11), ACCUMULATOR POSITIONING LEVER (12), ACCUMULATOR AUXILIARY POSITIONING BAR (5), ACCUMULATOR POSITIONING BAR (6) AND SYMBOL STOP BELLCRANK (1)(FIGURE 13)

(WHEN TOTAL CAM (14) RELEASES ROLL (V) ON TOTAL CONTROL CAM FOLLOWER (16), RESTORING ACCUMULATOR SECTION TO NEUTRAL POSITION).

SUBTRACT KEY OPERATION

DEPRESSION OF SUBTRACT KEY ROTATES SUBTRACT KEY ACTUATED BELLCRANK (9)(PLATE 21), POSITIONING OUTER STUD (G) OF BELLCRANK (9) IN PATH OF EXTENSION (F) ON ACCUMULATOR POSITIONING BAR (6). THIS WILL PREVENT ACCUMULATOR POSITIONING BAR (6) FROM MOVING REARWARD WHICH, IN TURN, WILL PREVENT ACCUMULATOR AUXILIARY POSITIONING BAR (5) FROM MOVING REARWARD THRU STUD (C) IN PATH OF AUXILIARY POSITIONING BAR (5). AT THIS TIME, POWER TRIP SLIDE (1) WILL BE PULLED FORWARD THRU SPRING (2) COMPRESSING SPRING (19) IN ACCUMULATOR POSITIONING YIELD (18).

BLOCKING BARS (5) AND (6) FROM MOVING REARWARD KEEPS ACCUMULATOR POSITIONING LINK (13) ENGAGED WITH LOWER STUD (P) ON ACCUMULATOR POSITIONING CAM (10) AND SYMBOL STOP BELLCRANK (1)(FIGURE 13) ABOVE STUD (A) IN SYMBOL CONTROL RACK (2). THIS PERMITS ACCUMULATOR TO MESH WITH UPPER PORTION OF RACKS AND SYMBOL CONTROL RACK TO MOVE FORWARD TO ALLOW MINUS SYMBOL TO PRINT.

POSITIVE TOTAL AND SUB-TOTAL KEY OPERATION

DEPRESSION OF TOTAL KEY ROTATES TOTAL KEY ACTUATED BELLCRANK (PLATE 21), POSITIONING OUTER STUD (M) OF BELLCRANK IN PATH OF EXTENSION (L) ON ACCUMULATOR AUXILIARY POSITIONING BAR (5). THIS WILL PREVENT AUXILIARY POSITIONING BAR (5) FROM MOVING REARWARD WHICH, IN TURN, WILL PREVENT ACCUMULATOR POSITIONING BAR (6) FROM MOVING REARWARD THRU BLOCKING DOG (4) ON AUXILIARY BAR (5) IN PATH OF STUD (C) ON ACCUMULATOR POSITIONING BAR (6). AT THIS TIME, POWER TRIP SLIDE (1) WILL BE PULLED FORWARD THRU SPRING (2) COMPRESSING SPRING (19) IN ACCUMULATOR POSITIONING YIELD (18).

BLOCKING BARS (5) AND (6) FROM MOVING REARWARD KEEPS ACCUMULATOR POSITIONING LINK (13) ENGAGED WITH LOWER STUD (P) ON ACCUMULATOR POSITIONING CAM (10) AND SYMBOL STOP BELLCRANK (1)(FIGURE 13) ABOVE STUD (A) IN SYMBOL CONTROL RACK (2). THIS PERMITS ACCUMULATOR TO MESH WITH UPPER PORTION OF RACKS AND SYMBOL CONTROL RACK TO MOVE FORWARD TO ALLOW TOTAL SYMBOL TO PRINT.

DEPRESSION OF SUB-TOTAL KEY ROTATES SUB-TOTAL KEY ACTUATED BELLCRANK (7)(PLATE 21) POSITIONING OUTER STUD (K) OF BELLCRANK (7) IN PATH OF EXTENSION (H) ON ACCUMULATOR AUXILIARY POSITIONING BAR (5) WHICH SETS UP MACHINE THE SAME AS FOR TOTAL OPERATION. ALSO, AS SUB-TOTAL KEY ACTUATED BELLCRANK (7) ROTATES, STUD (J) WILL PULL SUB-TOTAL LINK (15) FORWARD, INTERLOCKING TOTAL CONTROL CAM FOLLOWER (16) AND SUB-TOTAL CONTROL CAM FOLLOWER (17) THRU STUD (X). INTERLOCKING OF CAM FOLLOWERS IS NECESSARY TO KEEP ACCUMULATOR SECTION IN MESH WITH RACKS UNTIL END OF MACHINE CYCLE TO RE-ENTER AMOUNT INTO ACCUMULATOR RACK GEARS.

NON-ADD OPERATION

DEPRESSION OF NON-ADD KEY ROTATES NON-ADD KEY ACTUATED BELLCRANK (8), POSITIONING OUTER STUD (D) IN PATH OF EXTENSION (E) ON ACCUMULATOR POSITIONING BAR (6). THIS WILL PERMIT ACCUMULATOR POSITIONING BAR (6) AND ACCUMULATOR AUXILIARY BAR (5) TO MOVE REARWARD UNTIL EXTENSION (E) LIMITS ON STUD (D) IN NON-ADD KEY ACTUATED BELLCRANK (8). THIS, IN TURN, WILL ROTATE ACCUMULATOR POSITIONING LEVER (12) PARTIALLY, WHICH POSITIONS ACCUMULATOR POSITIONING LINK (13) MIDWAY BETWEEN UPPER STUD (N) AND LOWER STUD (P) OF ACCUMULATOR POSITIONING CAM (10). THEREFORE, WHEN ACCUMULATOR POSITIONING LINK (13) IS DRIVEN REARWARD, IT WILL PASS BETWEEN STUDS (N) AND (P), LEAVING ACCUMULATOR SECTION IN NORMAL OR NEUTRAL POSITION.

TOL AC
9 5 TOTAC

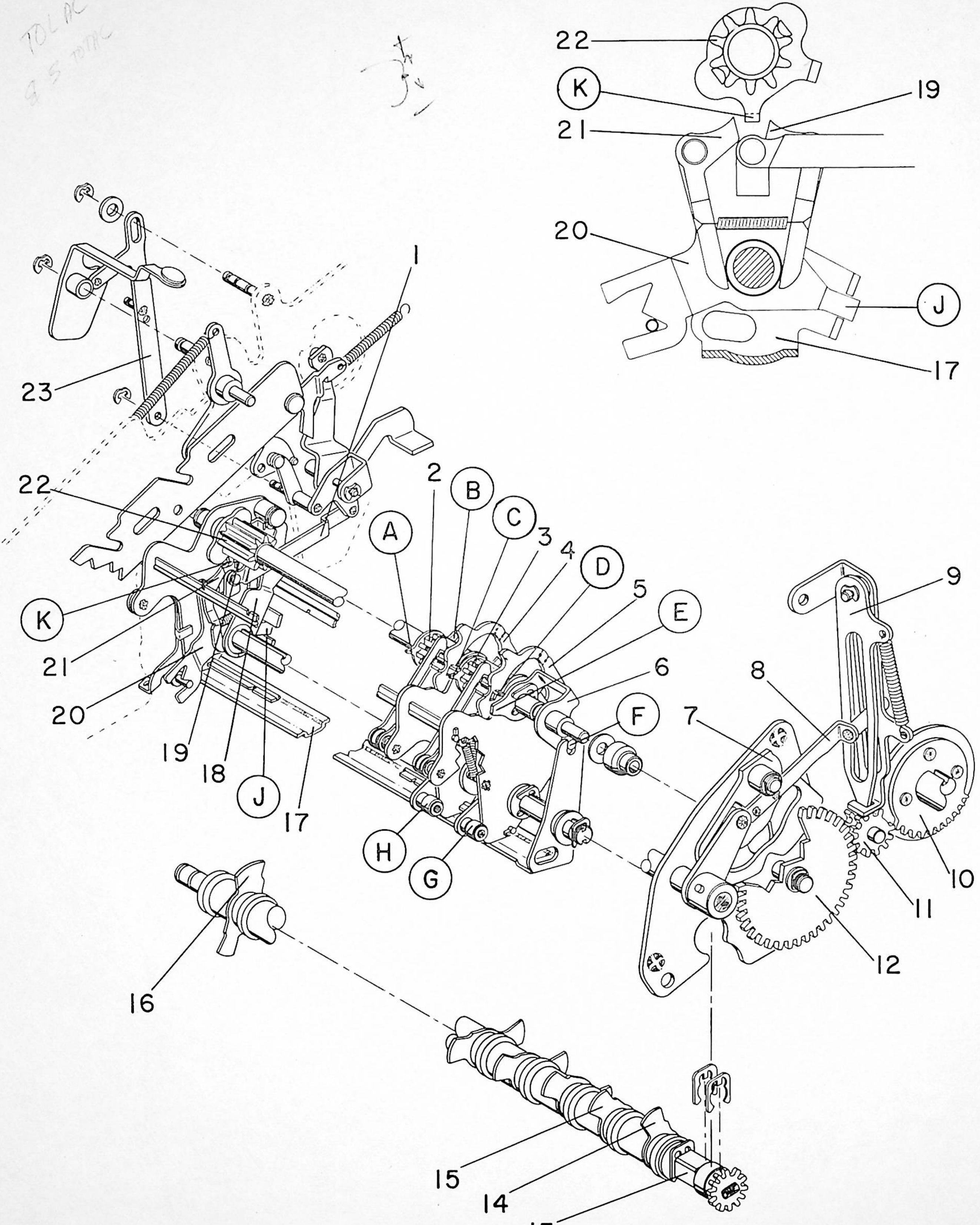


PLATE 22 CREDIT BALANCE

CREDIT BALANCE

CREDIT BALANCE MACHINES WERE DESIGNED TO CONVERT THE COMPLEMENTARY TOTAL INTO A TRUE NEGATIVE BALANCE. IN ORDER TO ACCOMPLISH THIS, TWO THINGS WERE NECESSARY - - (1) TO EXTRACT THE TOTAL FROM REVERSE SIDE OF ACCUMULATOR AND (2) TO DEVISE A MEANS OF RE-ENTERING THE LOST TRANSFER WHEN COMPLETE CARRY-OVER TOOK PLACE.

POSITIVE TO NEGATIVE OPERATION

WITH THE MACHINE IN NORMAL POSITIVE POSITION, DEPRESS NUMBER ONE AMOUNT KEY IN FIRST COLUMN OF KEYBOARD.

DEPRESS SUBTRACT KEY TO SET UP MACHINE AS WAS EXPLAINED UNDER ACCUMULATOR POSITIONING MECHANISM. AS MAIN CONTROL SHAFT STARTS TO ROTATE, ACCUMULATOR SECTION WILL BE LOWERED, MESHING RACK GEARS (3)(PLATE 22) WITH LOWER PORTION OF RACKS. CONTINUED ROTATION OF MAIN CONTROL SHAFT WILL DRIVE FIRST ORDER RACK FORWARD. THIS WILL ROTATE FIRST ORDER RACK GEAR (3) CLOCKWISE ONE SPACE FROM NEGATIVE NINE TO NEGATIVE ZERO, CAUSING TRANSFER CONDITIONING EAR (C) TO CONDITION SECOND ORDER TRANSFER PAWL (4) TO A MINUS POSITION. AT APPROXIMATELY HALF-CYCLE, ACCUMULATOR SECTION WILL BE RESTORED TO NORMAL OR NEUTRAL POSITION.

ON LAST THIRD OF MACHINE CYCLE, TRANSFER SHAFT (13) WILL BE ROTATED THRU GENEVA GEAR (10), INTERMITTENT GEAR (11) AND INTERMEDIATE GEAR (12). AS TRANSFER SHAFT (13) ROTATES, SECOND ORDER TRANSFER CAM (15) WILL CONTACT ROLL (H) ON SECOND ORDER TRANSFER PAWL (4), DRIVING IT FORWARD. THIS WILL ROTATE SECOND ORDER RACK GEAR (2) FROM NEGATIVE NINE TO NEGATIVE ZERO, CAUSING TRANSFER CONDITIONING EAR (A) TO CONDITION TRANSFER PAWL IN THIRD ORDER TO A MINUS POSITION. THRU CONTINUED ROTATION OF TRANSFER SHAFT (13) THIS WILL PRODUCE A TRANSFER IN EACH COLUMN TO LEFT, CAUSING A COMPLETE CARRY-OVER.

AS LAST RACK GEAR (22) WAS TURNED CLOCKWISE ONE SPACE BY ITS TRANSFER PAWL, EAR (K) ON GEAR (22) CONTACTED YIELD ARM (21) OF PASS-OVER MECHANISM (20), ROTATING SAME COUNTERCLOCKWISE. THRU EXTENSION (J) ON REAR END OF PASS-OVER (20), PENNY ENTRY BAIL (17) WILL BE ROTATED COUNTERCLOCKWISE. AS PENNY ENTRY BAIL (17) ROTATES, FORK ON RIGHT END OF BAIL ENGAGED WITH STUD (F) ON UNIT TRIP BAIL (6), ACTUATES BAIL (6) CLOCKWISE. EXTENSION (E) OF BAIL (6) CONTACTS TRANSFER CONDITIONING EAR (D) ON FIRST ORDER TRANSFER PAWL (5), CONDITIONING IT TO A MINUS POSITION.

ON SECOND WAVE OF TRANSFER SHAFT (13), FIRST ORDER TRANSFER CAM (14) WILL CONTACT ROLL (G) ON FIRST ORDER TRANSFER PAWL (5), DRIVING IT FORWARD. THIS WILL ROTATE FIRST ORDER RACK GEAR (3) FROM NEGATIVE ZERO TO NEGATIVE ONE. THUS WE HAVE RE-ENTERED THE ONE, NEGATIVELY, THAT WE ENTERED WITH SUBTRACT KEY, INTO THE FIRST ORDER RACK GEAR (3).

AT THE SAME TIME, PASS-OVER (20) ROTATED, TOTAL SELECTOR CONNECTING LINK (1) MOVED TO FRONT OF MACHINE. THIS WILL RAISE TOTAL SELECTOR POSITIONING LINK (23) AND, THRU STUD ON LINK (23), CAMS BLOCKING DOG (4)(PLATE 21) DOWN OUT OF PATH OF STUD (C) ON ACCUMULATOR POSITIONING CONTROL BAR (6).

NEGATIVE TOTAL OPERATION

DEPRESSION OF TOTAL KEY ROTATES TOTAL KEY ACTUATED BELLCRANK, POSITIONING OUTER STUD (M) IN PATH OF EXTENSION (L) ON ACCUMULATOR AUXILIARY POSITIONING BAR (5). THIS WILL PREVENT ACCUMULATOR AUXILIARY POSITIONING BAR (5) FROM MOVING REARWARD, WHICH, IN TURN, WILL KEEP SYMBOL STOP BELLCRANK (1)(FIGURE 13) ABOVE STUD (A) IN SYMBOL CONTROL RACK TO PERMIT (TC) SYMBOL TO PRINT.

SINCE BLOCKING DOG (4)(PLATE 21) ON ACCUMULATOR AUXILIARY POSITIONING BAR (5) IS OUT OF PATH OF STUD (C) ON ACCUMULATOR POSITIONING BAR (6), BAR (6) WILL MOVE REARWARD UNTIL IT LIMITS ON OUTER STUD (M) OF TOTAL KEY ACTUATED BELLCRANK. THIS WILL PERMIT ACCUMULATOR POSITIONING LEVER (12) TO ROTATE, ALLOWING ACCUMULATOR POSITIONING LINK (13) TO ENGAGE UPPER STUD (N) OF ACCUMULATOR POSITIONING CAM (10). POSITIONING OF PARTS IS ACCOMPLISHED THRU POWER TRIP SLIDE (1) AND ACCUMULATOR POSITIONING YIELD (18).

AS MAIN CONTROL SHAFT STARTS ITS CYCLE, TOTAL CONTROL CAM (14) WILL ROTATE TOTAL CONTROL CAM FOLLOWER (16) COUNTERCLOCKWISE. THIS WILL DRIVE ACCUMULATOR POSITIONING LINK (13) REARWARD, POSITIONING RACK GEARS IN MESH WITH UPPER PORTION OF RACKS. AT THE SAME TIME, STUD (W) IN CAM FOLLOWER (16) WILL DRIVE ZERO STOP ACTUATING LINK (1)(FIGURE 14) FORWARD, WHICH ROTATES ZERO STOP SHAFT (2), PRESENTING ACCUMULATOR ZERO STOPS (18) (PLATE 22) TO RACK GEARS (2).

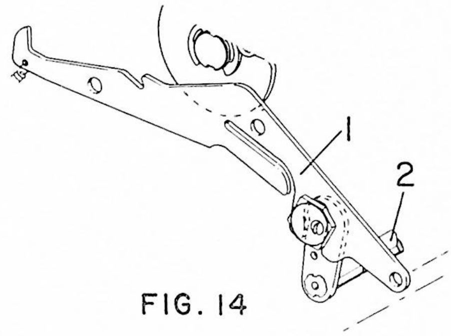


FIG. 14

AS MAIN CONTROL SHAFT CONTINUES TO ROTATE, MAIN RACKS WILL BE DRIVEN FORWARD, ROTATING RACK GEARS (2) COUNTERCLOCKWISE UNTIL ZERO STOP EAR (B) LIMITS ON UNDERSIDE OF ACCUMULATOR ZERO STOPS (18). THIS RESTORES RACK GEARS (2) TO NEGATIVE ZERO POSITION WHILE, AT THE SAME TIME, ALLOWS RACKS TO MOVE SAME NUMBER OF SPACES AS RACK GEARS (2) ARE TURNED. AT THE END OF FIRST HALF OF CYCLE, PRINTING LEVERS WILL BE RELEASED TO PRINT FIGURE ON TAPE ALONG WITH TOTAL CREDIT SYMBOL (TC).

ON SECOND HALF OF CYCLE, ACCUMULATOR SECTION WILL BE CENTERED BETWEEN UPPER AND LOWER TEETH OF RACKS AND MAIN RACKS WILL BE RESTORED TO NORMAL.

NEGATIVE SUB-TOTAL OPERATION

THIS OPERATION IS BASICALLY THE SAME AS A NEGATIVE TOTAL OPERATION EXCEPT THE ACCUMULATOR SECTION REMAINS IN A RAISED POSITION FOR APPROXIMATELY THE ENTIRE CYCLE BY SUB-TOTAL LINK (15)(PLATE 21) INTERLOCKING TOTAL CAM FOLLOWER (16) AND SUB-TOTAL CAM FOLLOWER (17). THEREFORE, ACCUMULATED AMOUNT WILL BE RE-ENTERED IN RACK GEARS ON SECOND HALF OF CYCLE.

AT END OF SECOND HALF OF CYCLE, PRINTING LEVERS ARE RELEASED TO PRINT FIGURE ON TAPE ALONG WITH SUB-TOTAL CREDIT SYMBOL (SC).

NEGATIVE TO POSITIVE OPERATION

WITH MACHINE IN NORMAL NEGATIVE POSITION, DEPRESS NUMBER ONE AMOUNT KEY IN FIRST COLUMN OF KEYBOARD.

DEPRESS ADD KEY TO SET UP MACHINE AS EXPLAINED UNDER ACCUMULATOR POSITIONING MECHANISM. AS MAIN CONTROL SHAFT STARTS TO ROTATE, ACCUMULATOR SECTION WILL BE RAISED, MESHING RACK GEARS (2)(PLATE 22) WITH UPPER PORTION OF RACKS. CONTINUED ROTATION OF MAIN CONTROL SHAFT WILL DRIVE FIRST ORDER RACK FORWARD. THIS WILL ROTATE FIRST ORDER RACK GEAR (3) COUNTERCLOCKWISE ONE SPACE FROM POSITIVE NINE TO POSITIVE ZERO, CAUSING TRANSFER CONDITIONING EAR (C) TO CONDITION SECOND ORDER TRANSFER PAWL (4) TO A PLUS POSITION. AT APPROXIMATELY HALF-CYCLE, ACCUMULATOR SECTION WILL BE RESTORED TO NORMAL OR NEUTRAL POSITION.

ON LAST THIRD OF MACHINE CYCLE, TRANSFER SHAFT (13) WILL BE ROTATED THRU GENEVA GEAR (10), INTERMITTENT GEAR (11) AND INTERMEDIATE GEAR (12). AS TRANSFER SHAFT (13) ROTATES, SECOND ORDER TRANSFER CAM (15) WILL CONTACT ROLL (H) ON SECOND ORDER TRANSFER PAWL (4), DRIVING IT FORWARD. THIS WILL ROTATE SECOND ORDER RACK GEAR (2) FROM POSITIVE NINE TO POSITIVE ZERO, CAUSING TRANSFER CONDITIONING EAR (A) TO CONDITION TRANSFER PAWL IN THIRD ORDER TO A PLUS POSITION. THRU CONTINUED ROTATION OF TRANSFER SHAFT (13) THIS WILL PRODUCE A TRANSFER IN EACH COLUMN TO LEFT, CAUSING A COMPLETE CARRY-OVER.

AS LAST RACK GEAR (22) WAS TURNED COUNTERCLOCKWISE ONE SPACE BY ITS TRANSFER PAWL, EAR (K) ON GEAR (22) CONTACTED YIELD ARM (19) OF PASS-OVER MECHANISM (20), ROTATING SAME CLOCKWISE. THRU EXTENSION (J) ON REAR OF PASS-OVER (20), PENNY ENTRY BAIL (17) WILL BE ROTATED CLOCKWISE. AS PENNY ENTRY BAIL (17) ROTATES, FORK ON RIGHT END OF BAIL ENGAGED WITH STUD (F) ON UNIT TRIP BAIL (6), ACTUATES BAIL (6) COUNTERCLOCKWISE. EXTENSION (E) OF BAIL (6) CONTACTS TRANSFER CONDITIONING EAR (D) ON FIRST ORDER TRANSFER PAWL (5), CONDITIONING IT TO A PLUS POSITION.

ON SECOND WAVE OF TRANSFER SHAFT (13), FIRST ORDER TRANSFER CAM (14) WILL CONTACT ROLL (G) ON FIRST ORDER TRANSFER PAWL (5), DRIVING IT FORWARD. THIS WILL ROTATE FIRST ORDER RACK GEAR (3) FROM POSITIVE ZERO TO POSITIVE ONE. THUS WE HAVE RE-ENTERED THE ONE, POSITIVELY, THAT WE ENTERED WITH ADD KEY, INTO THE FIRST ORDER RACK GEAR (3).

AT THE SAME TIME PASS-OVER (20) ROTATED, TOTAL SELECTOR CONNECTING LINK (1) MOVED TO REAR OF MACHINE, LOWERING TOTAL SELECTOR POSITIONING LINK (23) AND, THRU STUD ON LINK (23), CAMS BLOCKING DOG (4)(PLATE 21) UP INTO PATH OF STUD (C) ON ACCUMULATOR POSITIONING CONTROL BAR (6).

TOTAL AND SUB-TOTAL OPERATIONS WILL BE THE SAME AS PREVIOUSLY EXPLAINED.

TRANSFER CYCLE DISABLING CONTROL

ON A NEGATIVE SUB-TOTAL, IT WILL BE NECESSARY TO ELIMINATE THE TRANSFER SHAFT (13) (FIGURE 15) FROM ROTATING DUE TO THE ACCUMULATOR SECTION BEING RAISED IN MESH WITH RACKS FOR ENTIRE CYCLE. RAISING ACCUMULATOR SECTION POSITIONS ROLLS (G) ON TRANSFER PAWLS (5) CLOSER TO TRANSFER CAMS (14) AND, IF TRANSFER SHAFT (13) WAS ALLOWED TO ROTATE, TRANSFER CAMS (14) WOULD CONTACT ROLLS (G) AND DRIVE TRANSFER PAWLS (5) FORWARD UNTIL CARRYING POINTS LIMIT IN TEETH OF RACK GEARS (3). THIS WOULD PREVENT TRANSFER CAMS (14) FROM PASSING OVER ROLLS (G) THEREFORE CAUSING MACHINE TO LOCK UP.

AS ACCUMULATOR SECTION IS RAISED, TRANSFER DISABLING ARM AND ROLLER (8) ON RIGHT ACCUMULATOR POSITIONING CAM (7) WILL BE LOWERED, CAMMING TRANSFER SHIFTING LINK (9) TO THE RIGHT. TRANSFER SHIFTING LINK (9) ENGAGED WITH SLOT IN INTERMITTENT GEAR (11) MOVES INTERMITTENT GEAR (11) TO THE RIGHT, OUT OF MESH WITH GENEVA GEAR (10), THUS PREVENTING ROTATION OF TRANSFER SHAFT (13) ON LAST THIRD OF CYCLE.

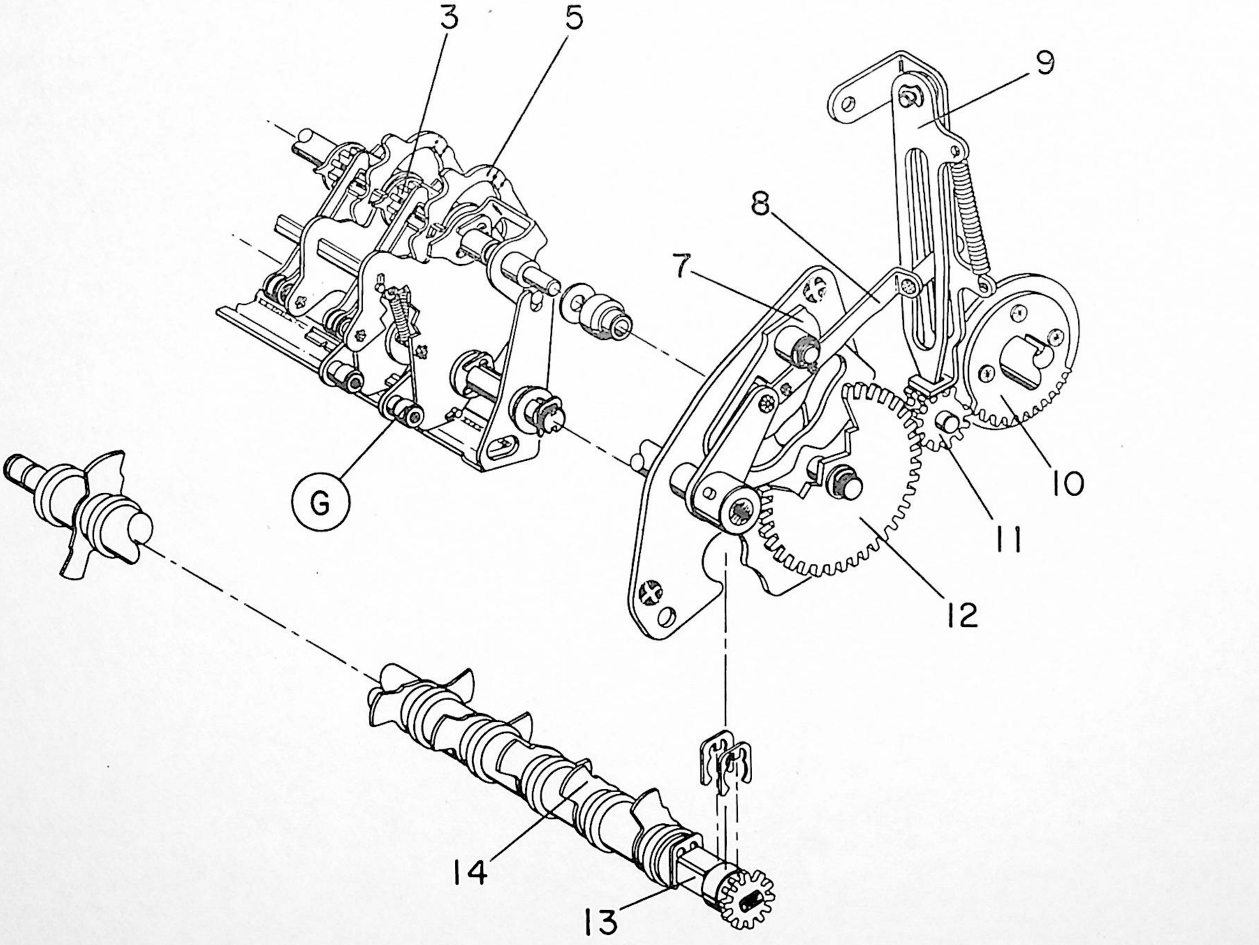


FIG. 15

PLATEN INDEXING CONTROL BAIL AUXILIARY LATCH

ON MACHINES EQUIPPED WITH POWER TRIP MECHANISM, THE TOTAL CONTROL CAM AND SUB-TOTAL CONTROL CAM ARRANGEMENT IS SUCH THAT TOTAL CONTROL CAM FOLLOWER RELEASES ZERO STOP ACTUATING LINK BEFORE PAPER IS SPACED ON TOTAL OPERATIONS. THEREFORE, PLATEN INDEXING CONTROL BAIL AUXILIARY LATCH (3)(FIGURE 16) IS MOUNTED ON SUB-TOTAL CAM FOLLOWER (2) TO HOLD PLATEN INDEXING CONTROL BAIL (1) ROTATED UNTIL AFTER PAPER IS SPACED.

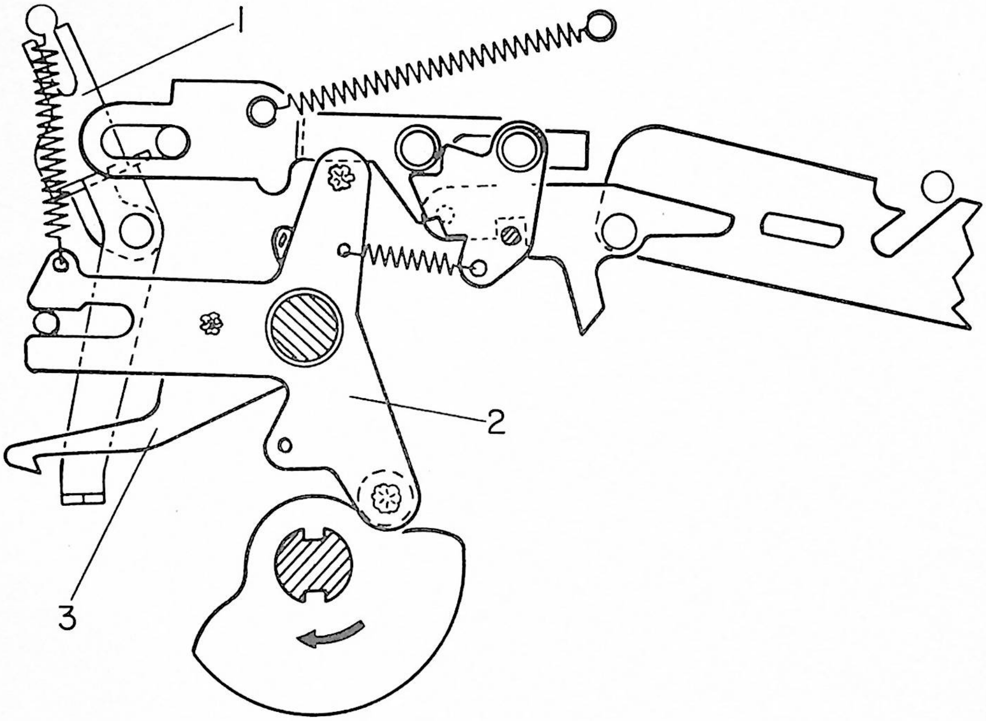


FIG. 16

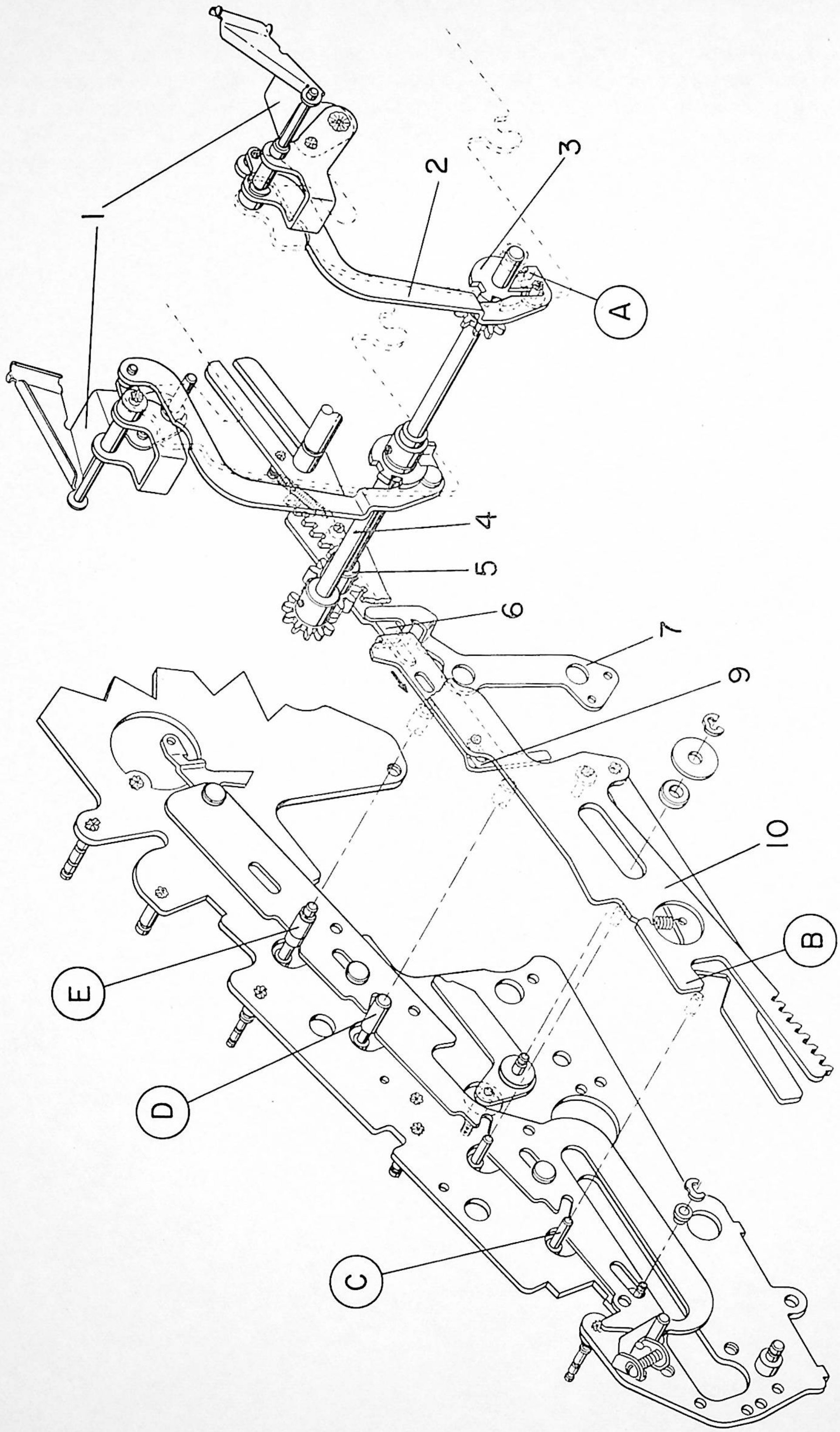


PLATE 23 NEGATIVE SYMBOLS and TWO-COLOR RIBBON

NEGATIVE SYMBOLS

IF A POSITIVE CONDITION EXISTS, SYMBOL RACK (10)(PLATE 23) WILL FUNCTION AS PREVIOUSLY EXPLAINED. HOWEVER, IF A NEGATIVE CONDITION EXISTS, DUE TO THE FACT ACCUMULATOR HAS RISEN TO THE ADD SIDE ON A SUB-TOTAL OR TOTAL, THE SYMBOL PAWL OPERATING ARM (7) ENGAGES WITH SYMBOL PAWL (6), CAMMING IT UPWARD. THIS NOW FREES SYMBOL STOP SLIDE (9) ON SYMBOL RACK (10) WHICH PERMITS SYMBOL RACK (10) TO MOVE FORWARD ONE MORE INCREMENT WHEN STOPPING AGAINST SUB-TOTAL BELLCRANK STUD (D), GIVING THE SYMBOL OF (SC) AND TO ALLOW THE SYMBOL RACK TO MOVE FORWARD ONE MORE INCREMENT WHEN STOPPING AGAINST TOTAL BELLCRANK STUD (E), GIVING THE SYMBOL OF (TC). WHEN THE SYMBOL RACK IS RESTORED BY RACK DRIVE, THE SYMBOL STOP SLIDE (9) RESTORES BY STOPPING AGAINST ACCUMULATOR PARALLEL SHAFT.

TWO-COLOR RIBBON MECHANISM

ON CREDIT BALANCE MACHINES, MINUS (-), TOTAL CREDIT (TC) AND SUB-TOTAL CREDIT (SC) SYMBOLS WILL BE PRINTED IN RED. THIS IS ACCOMPLISHED IN THE FOLLOWING MANNER:

ON SUBTRACT OPERATIONS, SYMBOL CONTROL RACK (10) WILL MOVE FORWARD UNTIL EXTENSION (B) LIMITS ON STUD (C) IN SUBTRACT KEY ACTUATED BELLCRANK. AS SYMBOL CONTROL RACK (10) MOVES FORWARD, SYMBOL GEAR SHAFT (5) WILL ROTATE CLOCKWISE AND SYMBOL CONTROL SHAFT (4) COUNTERCLOCKWISE. THIS WILL POSITION FIRST NOTCH IN COLOR SELECTING DISCS (3) IN PATH OF EARS (A) OF RIBBON CONTROL LINKS (2), PERMITTING EARS (A) TO ENTER FIRST NOTCH IN DISCS (3) WHICH ALLOWS RIBBON CONTROL LINKS (2) AND RIBBON ARMS (1) TO RAISE UNTIL THEY ARE LIMITED BY RIBBON UPSTOPS. THIS WILL RAISE RIBBON TO RED PRINTING POSITION.

ON SUB-TOTAL CREDIT (SC) OPERATIONS, SYMBOL CONTROL RACK (10) WILL MOVE FORWARD ONE MORE SPACE THAN ON POSITIVE SUB-TOTAL OPERATIONS AS WAS EXPLAINED UNDER THE SUBJECT OF "NEGATIVE SYMBOLS". THE EXTRA SPACE MOVEMENT OF SYMBOL CONTROL RACK (10) WILL POSITION SECOND NOTCH IN COLOR SELECTING DISC IN PATH OF EARS (A) OF RIBBON CONTROL LINKS (2) WHICH WILL PERMIT RIBBON CONTROL LINKS (2) AND RIBBON ARMS (1) TO RAISE UNTIL THEY ARE LIMITED BY RIBBON UPSTOPS. THIS WILL RAISE RIBBON TO RED PRINTING POSITION.

ON TOTAL CREDIT (TC) OPERATIONS, SYMBOL CONTROL RACK WILL MOVE FORWARD ONE MORE SPACE THAN ON POSITIVE TOTAL OPERATIONS AS WAS EXPLAINED UNDER SUBJECT OF "NEGATIVE SYMBOLS." THE EXTRA SPACE MOVEMENT OF SYMBOL CONTROL RACK (10) WILL POSITION THIRD NOTCH IN COLOR SELECTING DISC IN PATH OF EARS (A) OF RIBBON CONTROL LINKS (2), PERMITTING RIBBON CONTROL LINKS (2) AND RIBBON ARMS (1) TO RAISE UNTIL THEY ARE LIMITED BY RIBBON UPSTOPS, RAISING RIBBON TO RED PRINTING POSITION.

ON ADD, POSITIVE TOTALS AND POSITIVE SUB-TOTALS, EARS (A) ON RIBBON CONTROL LINKS (2) WILL LIMIT ON HIGH SURFACES OF COLOR SELECTING DISCS (3) WHICH KEEPS RIBBON IN BLACK PRINTING POSITION.

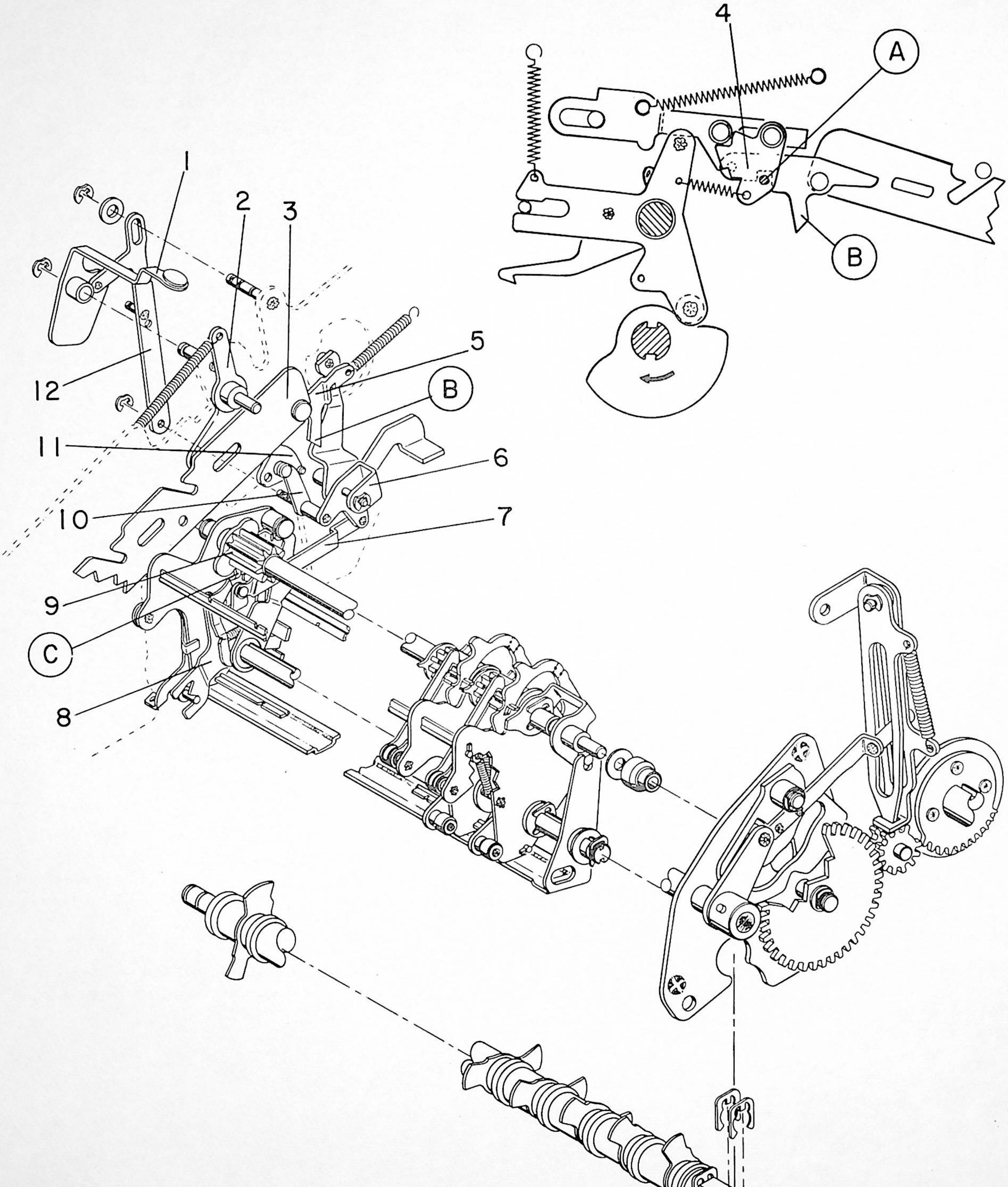


PLATE 24 DIVIDING EYE

DIVIDING EYE

THIS MECHANISM IS BETTER DESCRIBED FOR MECHANICAL PURPOSES AS ZERO LEVEL CUT-OFF. IT WAS DESIGNED TO STOP THE MACHINE AUTOMATICALLY WHEN THE ACCUMULATOR PASSES THROUGH ZERO GOING FROM POSITIVE TO NEGATIVE OR NEGATIVE TO POSITIVE.

MOST CREDIT BALANCE MODELS ARE EQUIPPED WITH THE DIVIDING EYE MECHANISM. THIS MECHANISM CONSISTS PRINCIPALLY OF A CREDIT BALANCE RACK GEAR (9)(PLATE 24), PASS-OVER (8), FLAG (1) AND CLUTCH CONTROL BAR (3). A SPECIAL EAR (C) WAS DESIGNED ON RACK GEAR (9) TO MOVE THE PASS-OVER (8) WHEN RACK GEAR (9) ROTATES THRU ZERO EITHER POSITIVELY OR NEGATIVELY. MOVEMENT OF PASS-OVER TO NEGATIVE DETENTED POSITION PULLS LINK (7) TOWARD FRONT OF MACHINE. LINK (7), CLIPPED TO TOTAL SELECTOR BELLCRANK (6), ROCKS BELLCRANK (6) CLOCKWISE. TOTAL SELECTOR BELLCRANK (6) HAS TWO LINKS CONNECTED TO FRONT STUD - TOTAL SELECTOR POSITIONING LINK (12) ON OUTSIDE OF LEFT FRAME AND ZERO STOP LINK CONNECTOR LINK (10) ON INSIDE OF FRAME. AS TOTAL SELECTOR BELLCRANK (6) ROTATES, ZERO STOP LINK CONNECTOR LINK (10) ROTATES ZERO STOP LINK CONNECTOR (11), MOVING REAR STUD ON CONNECTOR (11) UNDER EXTENSION (B) OF LIVE TIP (5) ON CLUTCH CONTROL BAR (3), UNLATCHING LIVE TIP (5) FROM STUD (A) OF POWER TRIP LATCH (4). AT THIS TIME, LIVE TIP LATCH (2) WILL SNAP OVER FRONT EXTENSION OF LIVE TIP (5), HOLDING IT ABOVE STUD (A) ON POWER TRIP LATCH (4) TO PREVENT RELATCHING STUD UNTIL CONTROL KEY RELEASES CLUTCH CONTROL BAR (3), ALLOWING IT TO RESTORE TO NORMAL. THIS INSURES THE MACHINE STOPPING AT THE END OF THIS OPERATION AS THE ACCUMULATOR HAS PASSED THROUGH ZERO.

AT THE TIME TOTAL SELECTOR BELLCRANK (6) ROTATED, TOTAL SELECTOR POSITIONING LINK (12) WAS DRIVEN UPWARD AND STUD ON FRONT EXTENSION OF LINK (12) ROTATED RED FLAG (1) TO FRONT, ALLOWING FLAG (1) TO APPEAR UNDER CASE WINDOW, INDICATING ACCUMULATOR HAS PASSED FROM POSITIVE, THRU ZERO, TO NEGATIVE.

IF MACHINE WERE IN NEGATIVE POSITION TO START, THE PASS-OVER (8) WOULD HAVE OCCURRED IN OPPOSITE DIRECTION. THE SAME PARTS WOULD HAVE RESTORED TO NORMAL WITH STUD ON ZERO STOP LINK CONNECTOR (11) CAMMING AGAINST FRONT OF EXTENSION (B) OF LIVE TIP (5) AND UNLATCHING IT TO STOP MACHINE. TOTAL SELECTOR POSITIONING LINK (12) WOULD HAVE BEEN PULLED DOWNWARD AND STUD ON ITS FRONT EXTENSION WOULD HAVE RESTORED RED FLAG (1) TO THE NON-VISIBLE POSITION.

THE DIVIDING EYE MECHANISM PERMITS DIVISION BY REPEATED SUBTRACTION OF DIVISOR. THE DIVISOR REDUCES THE DIVIDEND UNTIL ACCUMULATOR PASSES THRU ZERO. AT THIS TIME, MACHINE STOPS AUTOMATICALLY BY MEANS OF PASS-OVER MECHANISM. DIVISOR IS ADDED BACK TO CANCEL LAST SUBTRACT OPERATION, IN ORDER TO RETAIN TRUE REMAINDER, AND RE-ENTERED ONE ORDER TO RIGHT AND PROCEDURE REPEATED. THIS PROCEDURE WILL BE FOLLOWED UNTIL RED FLAG FAILS TO DISAPPEAR ON ADD-BACK OPERATION, AT WHICH TIME, TOTAL KEY IS DEPRESSED AND REMAINDER IS PRINTED. EACH ADD-BACK CANCELS LAST PREVIOUS SUBTRACT (SEE SAMPLE TAPE) AND NUMBER OF REMAINING SUBTRACT OPERATIONS FOR EACH ORDER IS COUNTED. THESE FIGURES CONSTITUTE THE QUOTIENT.

.00 T

1.45
1 = 1.20 −
~~1.20 −~~
~~1.20~~
2 = .12 −
.12 −
~~.12 −~~
~~.12~~
R. = .01 T

TWO-COLOR RIBBON INSPECTIONS AND ADJUSTMENTS

1. WITH MACHINE TURNED THRU ON SUBTRACT, SUB-TOTAL CREDIT OR TOTAL CREDIT OPERATION, RIBBON SHOULD BE PARALLEL AND RAISED TO PRINT SAFELY IN RED. ALSO, EARS (A) (FIGURE 17) ON RIBBON CONTROL LINKS (2) SHOULD CENTER AND NOT BOTTOM IN NOTCHES IN COLOR SELECTING DISCS (3).

   ADJ. FORM RIBBON ARMS (1) UP OR DOWN.

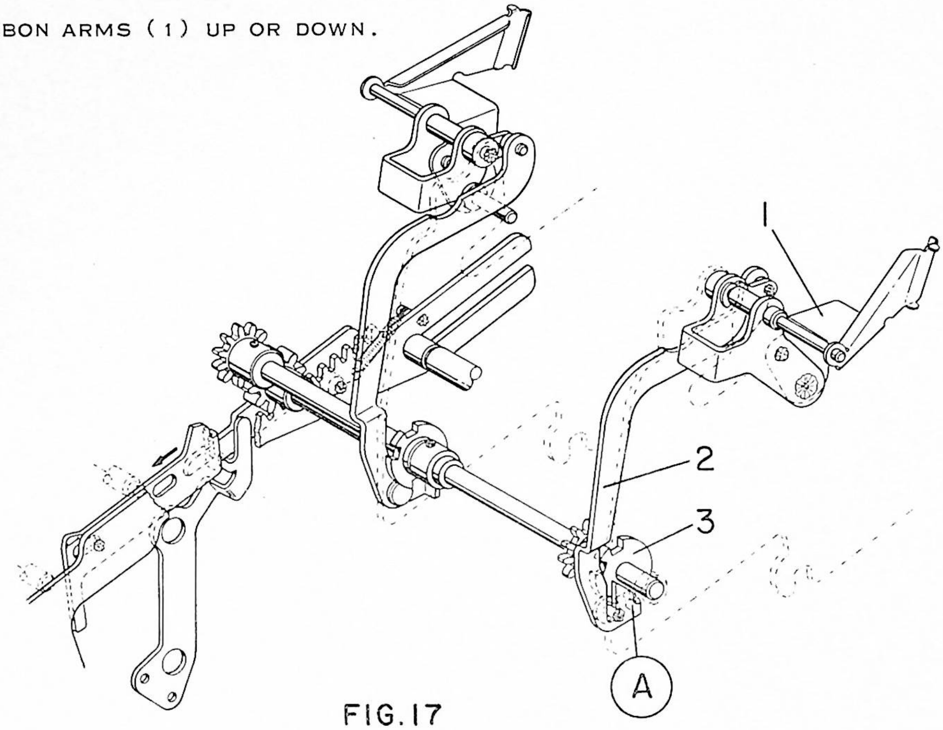


FIG. 17

2. WITH MACHINE TURNED THRU ON ADD, NON-ADD, POSITIVE TOTAL OR POSITIVE SUB-TOTAL, FIGURES SHOULD BE PRINTED IN BLACK.

   ADJ. FORM OFFSET IN RIBBON CONTROL LINKS (2)(FIGURE 17).

INSPECTIONS AND ADJUSTMENTS

1. ACCUMULATOR TRANSFER INTERMEDIATE GEAR (12)(FIGURE 18) SHOULD HOLD TRANSFER CAM SHAFT (13) IN A POSITION WHICH PLACES SMALL EXTENSION (14A) OF LAST CAM (14) ON LEFT, IN FRONT OF AND AS CLOSE AS POSSIBLE TO, ROLLER (G) ON TRANSFER PAWL (5).

   ADJ. MACHINE NORMAL, MOVE ACCUMULATOR TRANSFER INTERMEDIATE GEAR (12) OUT OF MESH WITH TRANSFER SHAFT (13), TURN SHAFT (13) TO DESIRED POSITION AND RE-MESH GEAR (12).

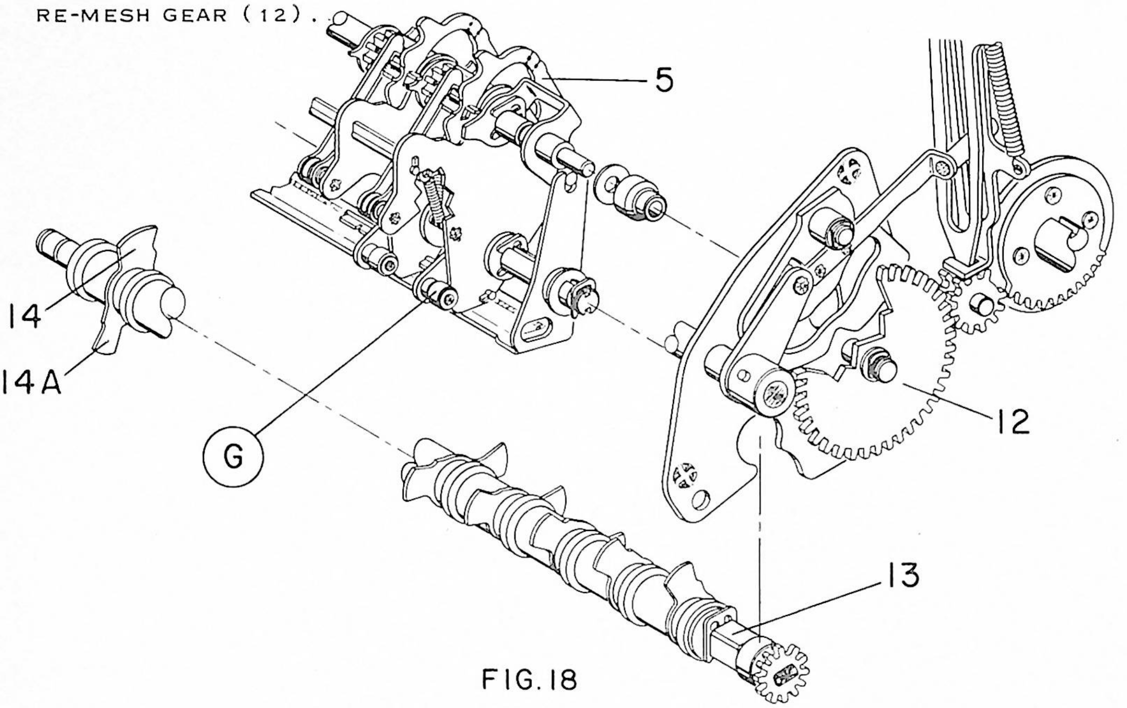


FIG. 18

2. NOTCH ON LIVE TIP (4) (FIGURE 19) SHOULD CENTER OVER STUD (C) ON POWER TRIP LATCH (3) IN NORMAL POSITION.

   ADJ. TORQUE ADD CLUTCH CONTROL PARALLEL SHAFT (1) BETWEEN TWO FLATS.

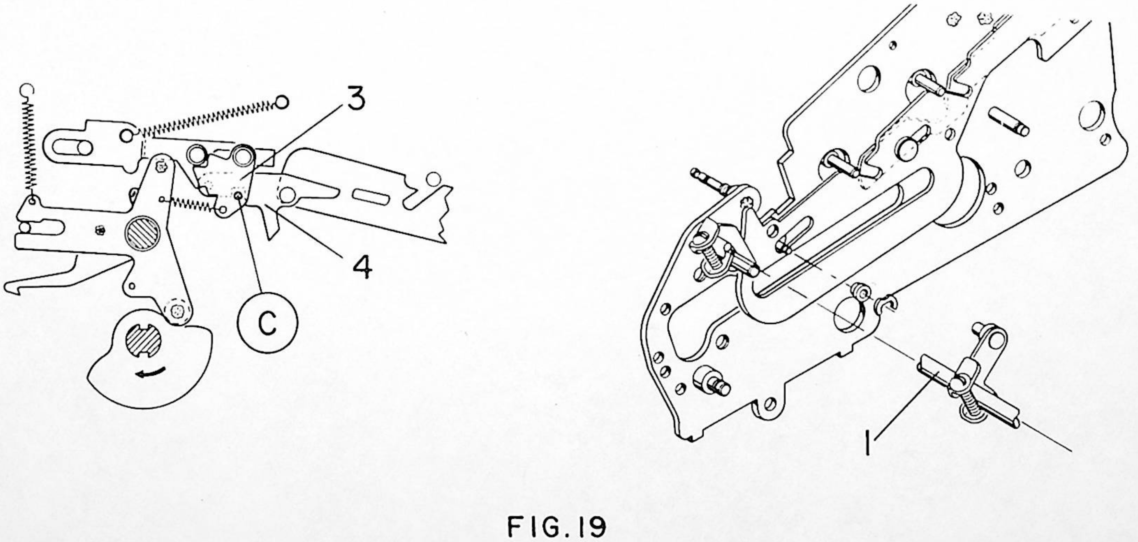


FIG. 19

3. WITH NON-ADD KEY DEPRESSED ACCUMULATOR POSITIONING CONTROL LEVER (12)(FIG. 20) SHOULD POSITION ACCUMULATOR POSITIONING LINK (13) CENTRALLY BETWEEN STUDS (N) AND (P) ON ACCUMULATOR POSITIONING CAM (10). LINK SHOULD ALSO SAFELY ENGAGE STUD (N) ON (T), (TC) AND (SC) OPERATIONS AND STUD (P) ON (-), (T) AND (S) OPERATIONS.

ADJ: FORM ACCUMULATOR POSITIONING CONTROL LEVER (12).

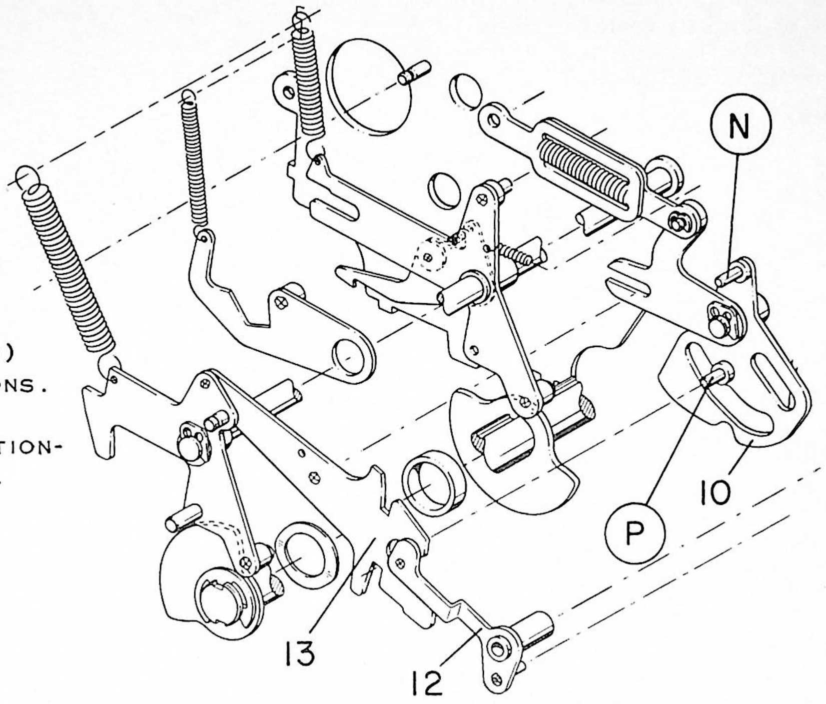


FIG. 20

4. SUB-TOTAL CAM FOLLOWER (12)(FIGURE 21) SHOULD RESTORE POWER TRIP SLIDE (1) .005" TO .010" PAST LATCHING POSITION OF POWER TRIP LATCH (3).

ADJ. FORM UPPER EXTENSION OF SUB-TOTAL CAM FOLLOWER (12) TO TIP STUD (D).

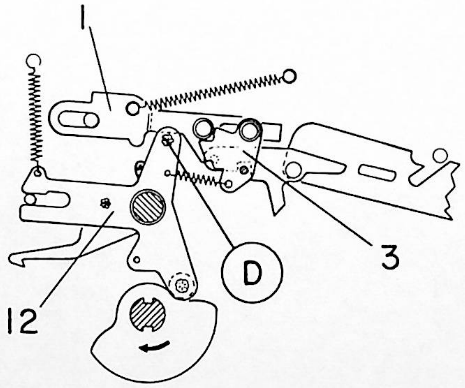


FIG. 21

5. WHEN MACHINE IS NEGATIVE, BLOCKING DOG (4) (FIGURE 22) SHOULD SAFELY CLEAR UNDERSIDE OF STUD (C) ON ACCUMULATOR POSITIONING BAR (6) AND WHEN MACHINE IS POSITIVE, BLOCKING DOG (4) SHOULD SAFELY LOCK AUXILIARY BAR (5) TO STUD (C).

   ADJ. FORM REAR EXTENSION (A) OF ACCUMULATOR POSITIONING AUXILIARY BAR (5).

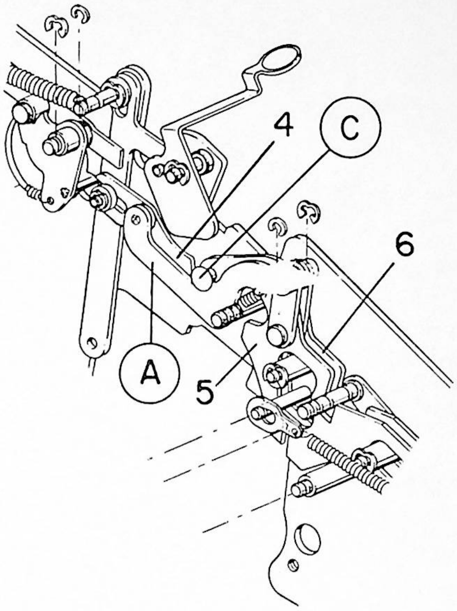


FIG. 22

THE FOLLOWING PAGES (121 THROUGH 164) COVER THE MANUAL FULL KEYBOARD MACHINE AND THE TEN-KEY ADDING MACHINE. THESE PAGES WILL DESCRIBE THE DIFFERENCES BETWEEN THESE TWO MODELS AND THE ELECTRIFIED FULL KEYBOARD MACHINE; THEREFORE, THE THEORY AND ADJUSTMENTS OUTLINED IN PAGES 10 THROUGH 119, AS APPLICABLE, ARE TO BE USED AS A BASIS FOR THESE TWO MODELS.

HAND ADDING MACHINE

BASICALLY, THE HAND MACHINE FUNCTIONS EXACTLY LIKE THE POWER-DRIVEN MACHINE WITH THE EXCEPTION THAT THE CONTROL MECHANISMS ARE LOCATED DIFFERENTLY AND USE A FEW DIFFERENT PARTS TO ACTUATE THESE CONTROLS. FOR EXAMPLE - - ACCUMULATOR AND SYMBOL CONTROLS ARE NOW LOCATED ON THE RIGHT HAND SIDE OF MACHINE, WHERE, ON POWER-DRIVEN MACHINE, THEY ARE LOCATED ON THE LEFT. THE HAND MACHINE WAS DESIGNED TO CONFORM TO THE SAME DESIGN AS THE POWER-DRIVEN MODELS IN THAT WE USE THE FULL 360° ROTATION OF TRANSFER LINE. HOWEVER, CAM LINE IS RECIPROCAL AND MUST BE RETURNED TO ITS ORIGINAL POSITION BEFORE THE NEXT CYCLE IS ACTUATED.

KEYBOARD

THE KEYBOARD IS THE SAME EXCEPT CONTROL KEYS HAVE ALL BEEN PLACED ON RIGHT HAND SIDE FOR EASE OF OPERATION AND PROXIMITY TO HANDLE.

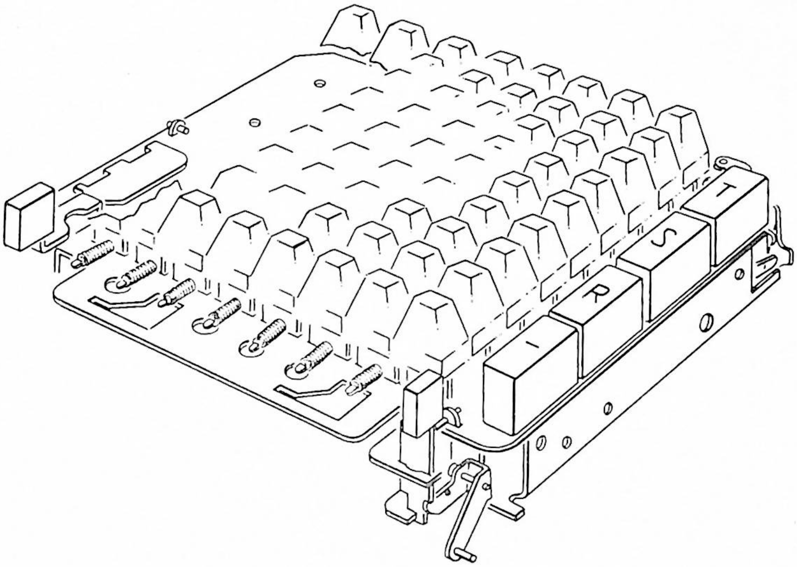


FIG. 1

CORRECTION KEY BAIL

INSTALLATION OF CORRECTION KEY BAIL (5) (FIGURE 2) PROVIDES AN ACTUATOR FOR CONTROL KEY LATCH (4). AS CORRECTION KEY (6) IS DEPRESSED, IT CONTACTS CORRECTION KEY BAIL (5), MOVING STUD "B" ON BOTTOM OF BAIL (5) TOWARD REAR. STUD "B" CONTACTS CONTROL KEY LATCH (4), DRIVING IT REARWARD AND UNLATCHING ANY CONTROL KEY THAT WAS DEPRESSED. STUD "A" ON CONTROL KEY LATCH (4) CONTACTS KEY RELEASE LEVER (3) WHICH CLEARS KEYBOARD THROUGH KEY RELEASE BAR (2) AND ZERO STOP AND LOCK BARS (1).

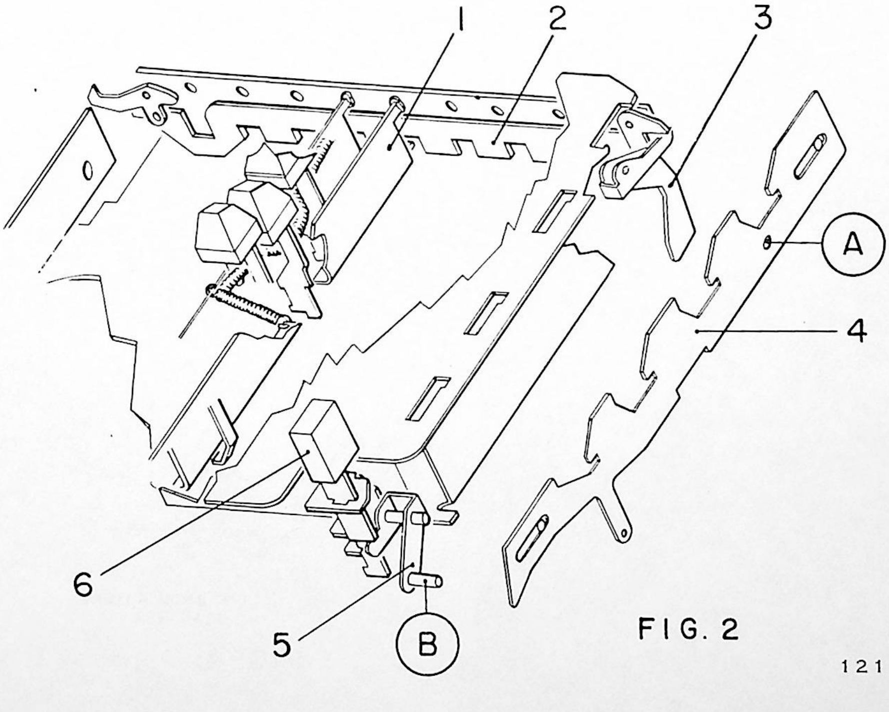


FIG. 2

PRINTER

PAPER FEED

PLATEN SPACING LINK (4) (FIGURE 3) IS NORMALLY HELD IN A DOWNWARD POSITION AND IS HELD CLEAR OF PLATEN RATCHET (1) BY EXTENSION "B" ON PLATEN CENTRALIZING ARM (6). AS HANDLE IS OPERATED FORWARD, PLATEN INDEXING CAM (3) WILL ALLOW PLATEN INDEXING CAM FOLLOWER (2) TO ROTATE, PERMITTING PLATEN SPACING LINK (4) TO MOVE UPWARD THROUGH SPRING (5). AS HANDLE RESTORES REARWARD, PLATEN INDEXING CAM (3) WILL ROTATE PLATEN INDEXING CAM FOLLOWER (2), LOWERING PLATEN SPACING LINK (4). AS LINK (4) IS LOWERED, EAR "A" WILL PICK UP TOOTH ON PLATEN RATCHET (1), ROTATING PLATEN (7) ONE SPACE.

THE PLATEN INDEXING BAIL (8) IS PIVOTED ON TWO STUDS IN THE HAND MACHINE. ONE STUD IS LOCATED ON LEFT PRINTER SIDE FRAME AND ONE ON LEFT SIDE FRAME. ON TOTAL OR SUB-TOTAL OPERATION, PLATEN INDEXING BAIL (8) WILL ROTATE PLATEN INDEXING CONTROL LEVER (9) TO PERMIT PLATEN INDEXING LINK (4) TO ENGAGE THIRD TOOTH OF PLATEN RATCHET (1) TO TRIPLE SPACE PLATEN (7).

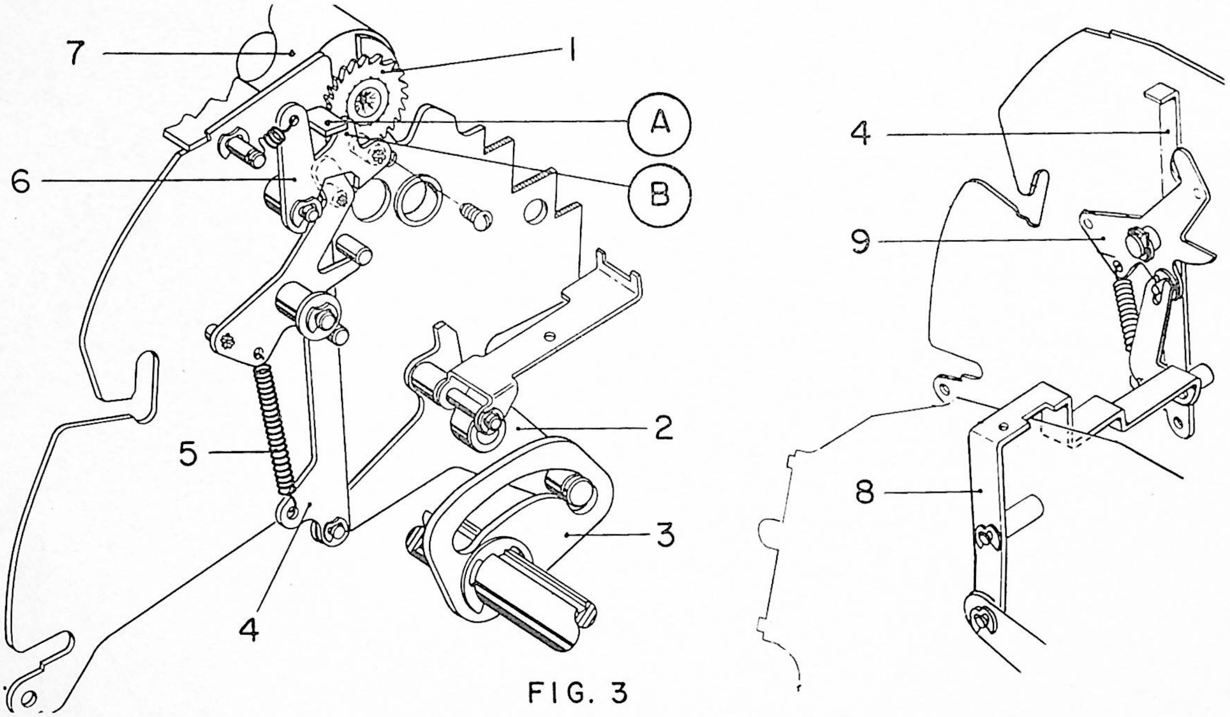


FIG. 3

RIBBON FEED AND REVERSE

RIBBON FEED AND REVERSE IS THE SAME ON HAND MACHINES EXCEPT RIBBON FEED PAWL (1) WORKS UNDERNEATH RIBBON RATCHET GEAR HUB (2) AND PUSHES HUB TO TURN RIBBON FEED SHAFT.

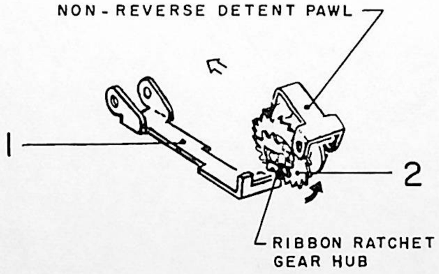


FIG. 4

RIBBON POSITIONING

THE SINGLE COLOR RIBBON IS RAISED BY TWO SPRING-ACTUATED RIBBON ARMS (1) (FIGURE 5) WHEN THEY ARE RELEASED BY PRINTER CONTROL SHAFT ARM (2). RIBBON ARMS ARE UP-LIMITED BY RIBBON ARM STOPS (3) DURING THE PRINTING OPERATION AND RESTORED BY PRINTER CONTROL SHAFT ARM (2) AFTER PRINTING.

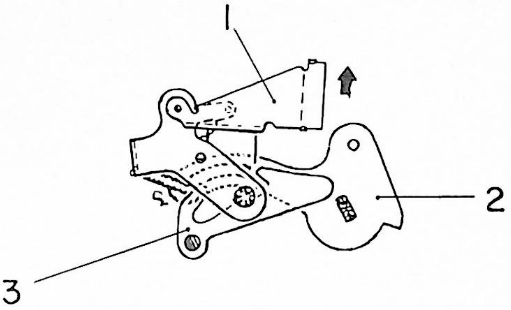


FIG. 5

PRINTING

ROTATION OF PRINTING DIALS (1)(FIGURE 6) IS CLOCKWISE ON HAND MODELS THE SAME AS ELECTRIC MODELS. CAM GEARS (3) ARE DIRECTLY ENGAGED WITH OFFSET RACKS (5) WHEN PRINTER IS INSTALLED. CAM GEAR LINER (8) IS LINKED TO LINER CONTROL CAM FOLLOWER (6) AND LINER CONTROL CAM (7) BY LINER CONTROL LINK (4) WHEN PRINTER IS INSTALLED IN MACHINE. THIS HOLDS CAM GEARS (3) WHEN PRINTING LEVERS (2) ARE RELEASED TO PRINT AND ALLOWS RELEASE LATCHES (9) TO LATCH PRINTING LEVERS (2) TO LEFT OF LISTED FIGURE TO PREVENT PRINTING.

PRINTING LEVERS (2) ARE RELEASED TO PRINT THROUGH RACK DRIVE CAM, RIGHT (12), DRIVING PRINTER CONTROL LINK (11) UPWARD, RELEASING PRINTER CONTROL CAM (10) FROM PRINTER CONTROL CAM ROLLER "A" (FIGURE 7).

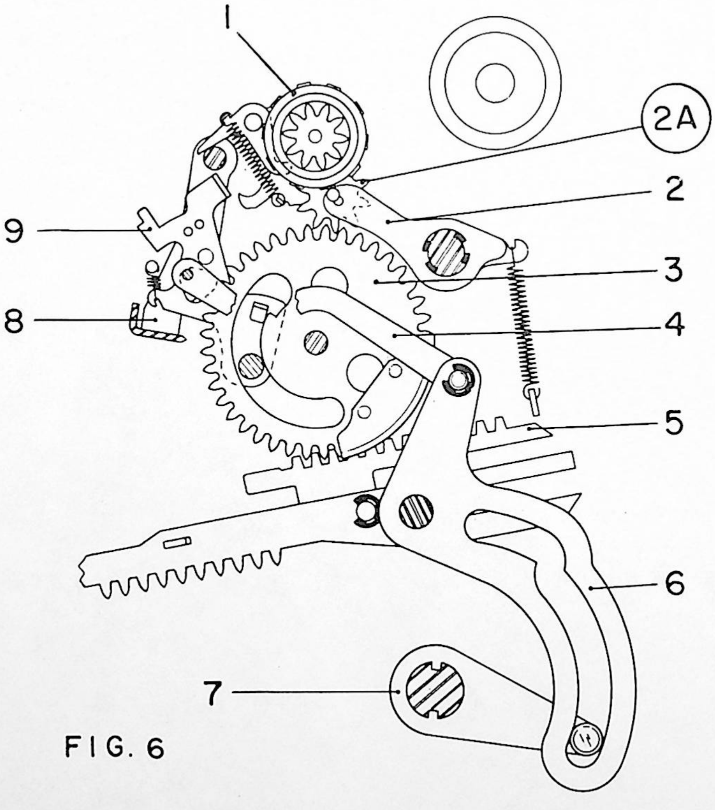


FIG. 6

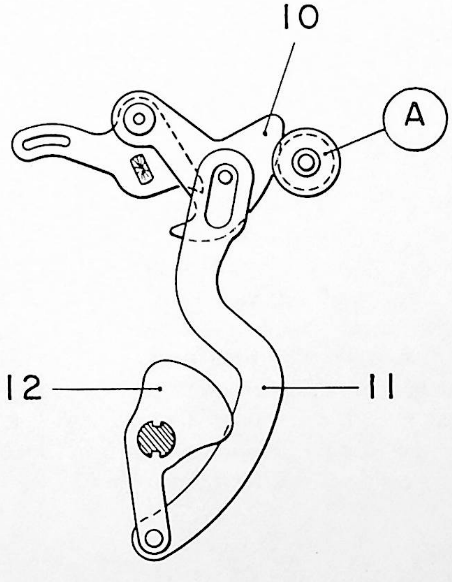


FIG. 7

CONTROL KEYS AND THEIR FUNCTIONS

ADD

HANDLE (1) (FIGURE 8) IS THE ADD CONTROL FOR HAND MODEL ADDING MACHINES. ALL CONTROLS ARE CONDITIONED FOR AN ADD OPERATION WHEN MACHINE IS NORMAL, E.G., WITH ACCUMULATOR POSITIONING LINK (2) ENGAGED WITH TOP STUD "A" OF ACCUMULATOR POSITIONING CAM. AS HANDLE IS PULLED, HANDLE DRIVE BAR AND LINK (7) PULLS FULL STROKE SECTOR (6) TOWARD FRONT. RACEWAY ON FULL STROKE SECTOR (6) ACTUATES ACCUMULATOR POSITIONING CONTROL CAM FOLLOWER (3) TOWARD THE REAR. STEP ON CAM FOLLOWER (3) CONTACTS ACCUMULATOR CONTROL LATCH (4), PULLING LATCH (4) AND ACCUMULATOR POSITIONING LINK (2) TO REAR. AS ACCUMULATOR POSITIONING LINK (2) IS ENGAGED WITH TOP STUD "A" OF ACCUMULATOR POSITIONING CAM, THIS WILL RAISE ACCUMULATOR TO ENGAGE WITH TOP OR ADD SIDE OF MAIN RACKS. AT END OF FORWARD STROKE, ACCUMULATOR RETURN STUD "B" CONTACTS ACCUMULATOR RESTORE LIVE TIP (5) WHICH CAMS ACCUMULATOR CONTROL LATCH (4) OFF STEP ON CAM FOLLOWER (3). RETURN STUD "B" WILL ALSO DRIVE LIVE TIP (5) AND ACCUMULATOR POSITIONING LINK (2) FORWARD, RESTORING ACCUMULATOR TO NORMAL OR CENTER POSITION.

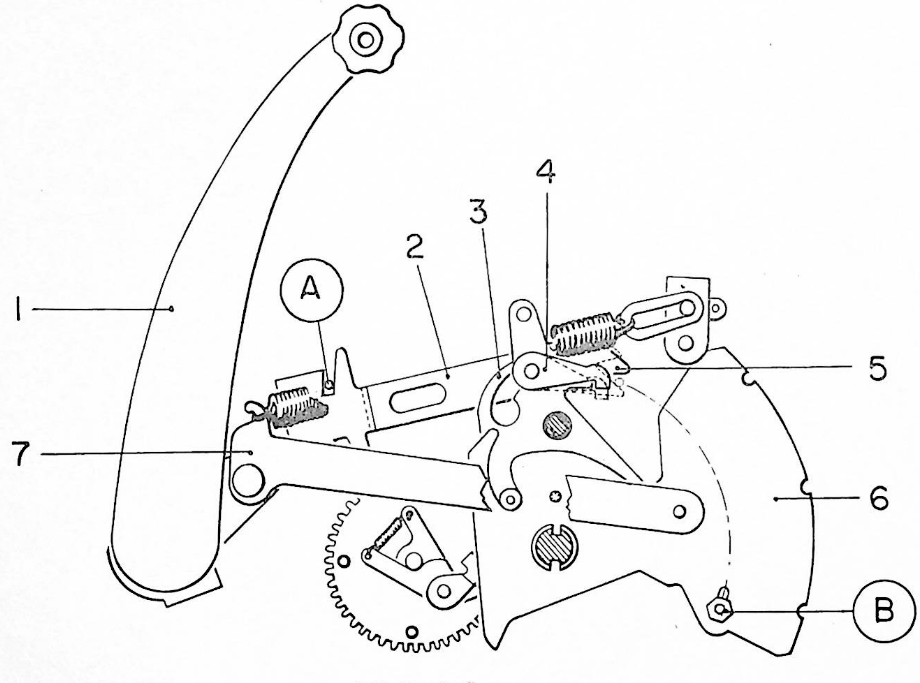


FIG. 8

NEAR END OF FORWARD STROKE, YIELDING PAWL (3) (FIGURE 8A) ON TRANSFER DRIVE ASSEMBLY (2) YIELDS OVER LOWER STUD "A" ON TRANSFER DRIVING GEAR (1). ON RETURN STROKE, PAWL (3) CONTACTS LOWER STUD "A" AND ROTATES DRIVING GEAR (1) 90° IN A COUNTERCLOCKWISE POSITION, TURNING TRANSFER SHAFT (4) THROUGH A FULL 360° CYCLE. THIS POSITIONS BOTH DRIVING GEAR (1) AND TRANSFER SHAFT (4) FOR NEXT OPERATION.

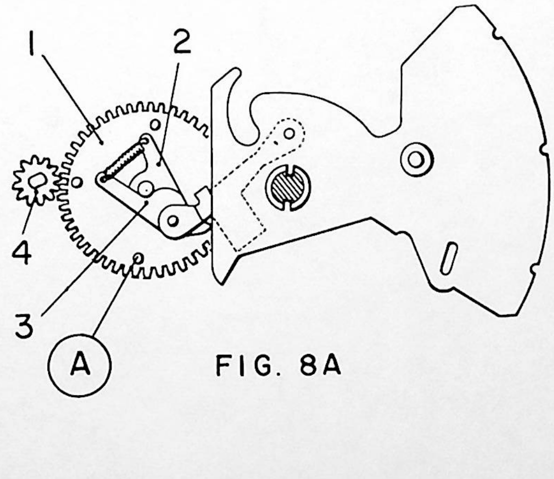


FIG. 8A

REPEAT

REPEAT KEY (1) (FIGURE 9), THROUGH REPEAT KEY LINK (5), MERELY HOLDS AUTOMATIC KEY RELEASE LINK (4) BELOW CUT-OUT ON CONTROL KEY LATCH (3). THIS PREVENTS CONTROL KEY LATCH (3) FROM ACTUATING KEY RELEASE LEVER (2) AND CLEARING AMOUNT KEYS DEPRESSED IN KEYBOARD. REPEAT KEY (1) IS UNLATCHED THROUGH DEPRESSION OF ANY OTHER CONTROL KEY OR CORRECTION KEY.

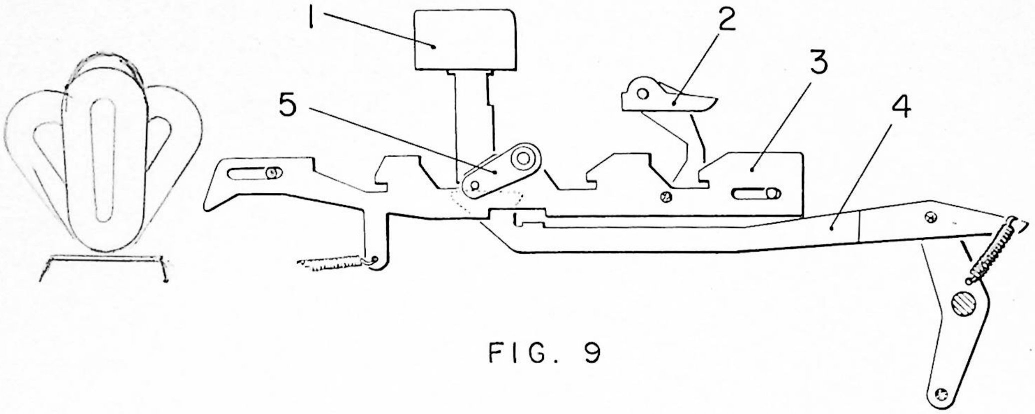


FIG. 9

SUBTRACT

AS SUBTRACT KEY IS DEPRESSED, OUTER STUD "C" (FIGURE 10) ON MINUS BELLCRANK CONTACTS CAMMING SURFACE OF ACCUMULATOR POSITIONING CONTROL CAM BAR (5), ACTUATING BAR FORWARD. REAR PORTION OF BAR (5) IS ENGAGED WITH LARGE STUD "A" ON ACCUMULATOR CONTROL TOGGLE (2) AND STRAIGHTENS TOGGLE TOWARD FRONT, LOWERING ACCUMULATOR POSITIONING BAR (3) INTO ENGAGEMENT WITH LOWER STUD "B" IN ACCUMULATOR POSITIONING CAM (4). THIS WILL LOWER ACCUMULATOR TO ENGAGE THE SUBTRACT SIDE OF MAIN RACKS WHEN HANDLE IS OPERATED.

WHEN CONTROL KEY IS DEPRESSED, STUD "D" ON CONTROL KEY BELLCRANK CAMS CONTROL KEY LATCH (1) TO REAR AND MOVES BELOW CAMMING SURFACE AND IS THEN TRAPPED WHEN CONTROL KEY LATCH (1) IS URGED FORWARD BY ITS SPRING (7). CONTROL KEY BELLCRANK WILL REMAIN TRAPPED UNTIL AUTOMATIC KEY RELEASE (6) PULLS CONTROL KEY LATCH (1) TO REAR, RELEASING TRAPPED BELLCRANK STUD "D".

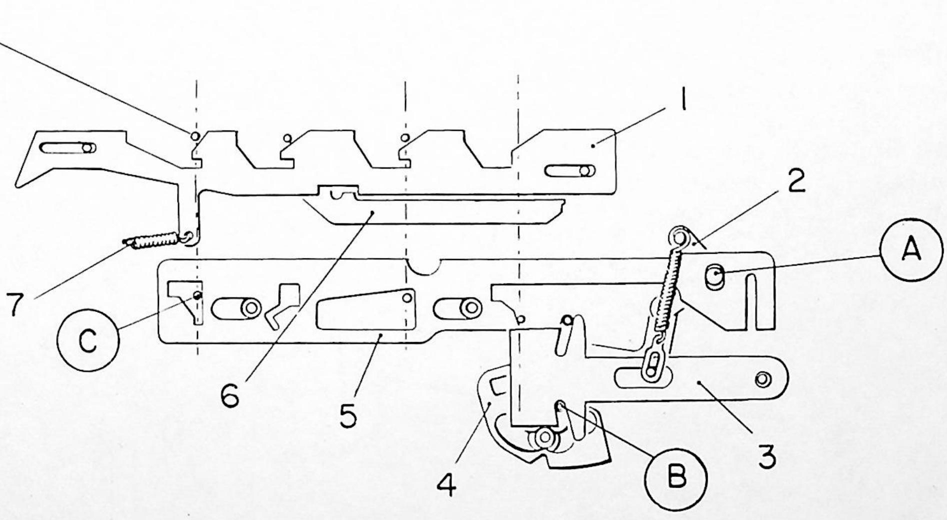


FIG. 101

SUB-TOTAL

SUB-TOTAL KEY (1) (FIGURE 11) ROTATES SUB-TOTAL BELLCRANK (5) WHICH ACTUATES TOTAL KEY BELLCRANK (2) BY MEANS OF SUB-TOTAL LINK (3) CONTACTING STUD ON TOTAL KEY BELLCRANK (2). BY ACTUATING TOTAL KEY BELLCRANK (2), ACCUMULATOR POSITIONING CONTROL CAM BAR (5) (FIGURE 10) CAN THEN SET UP POSITIONING OF ACCUMULATOR AS IN SUBTRACT OPERATION. THIS CONDITION IS DESIRED ON BOTH SUB-TOTAL AND TOTAL OPERATIONS AS TOTALS ARE EXTRACTED FROM THE LOWER OR SUBTRACT SIDE OF MAIN RACKS.

AS SUB-TOTAL LINK (3) (FIGURE 11) IS ACTUATED, SLOT AT REAR OF LINK (3) MOVES INTO POSITION TO CHOKE OFF ACCUMULATOR RESTORE LIVE TIP (4) TO PREVENT ACCUMULATOR RETURN STUD "B" (FIGURE 8) FROM CENTRALIZING ACCUMULATOR AT END OF FORWARD STROKE.

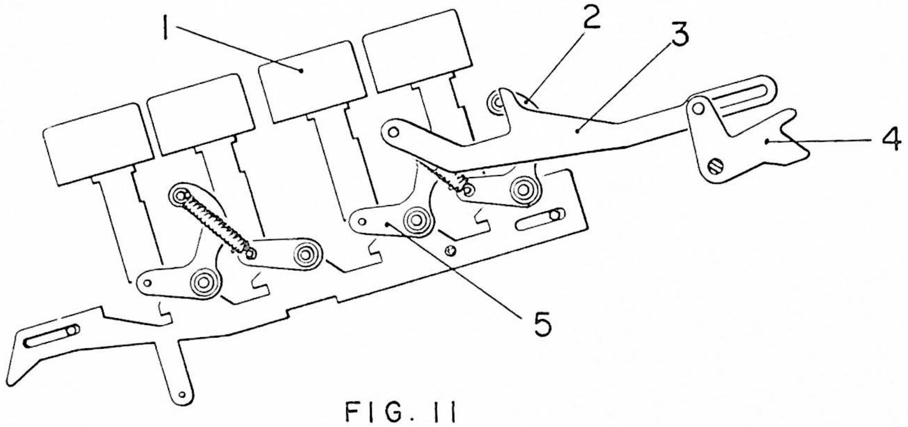


FIG. 11

ALSO, AS SUB-TOTAL LINK (3) (FIGURE 11) ACTUATES TOTAL KEY BELLCRANK (2), ZERO STOP CONNECTOR LINK (4) (FIGURE 12) RAISES REAR OF ZERO STOP ACTUATING LINK (3) IN POSITION TO ALLOW STUD "A" ON ACCUMULATOR CONTROL CAM FOLLOWER (2) TO DRIVE LINK (3) FORWARD, PRESENTING ZERO STOPS (5) TO ACCUMULATOR WHICH BLOCKS TRAVEL OF MAIN RACKS. AS LINK (3) IS ACTUATED, ROCKING ZERO STOP SHAFT (6) ARM ON LEFT END OF SHAFT ACTUATES POWER KEY RELEASE LINKAGE WHICH, IN TURN, CONDITIONS PLATEN INDEXING CONTROL BAIL (1) TO TRIPLE SPACE POSITION AND POWER KEY RELEASE ARM (7) TO CLEAR AMOUNT KEYS IN KEYBOARD.

TOTAL

THE TOTAL OPERATION IS IDENTICAL TO SUB-TOTAL WITH SOLE EXCEPTION BEING FAILURE TO ACTUATE SUB-TOTAL LINK (3)(FIG.11) TO CHOKE OFF ACCUMULATOR RESTORE LIVE TIP (4). THIS WILL ALLOW ACCUMULATOR TO RESTORE AT END OF FORWARD STROKE.

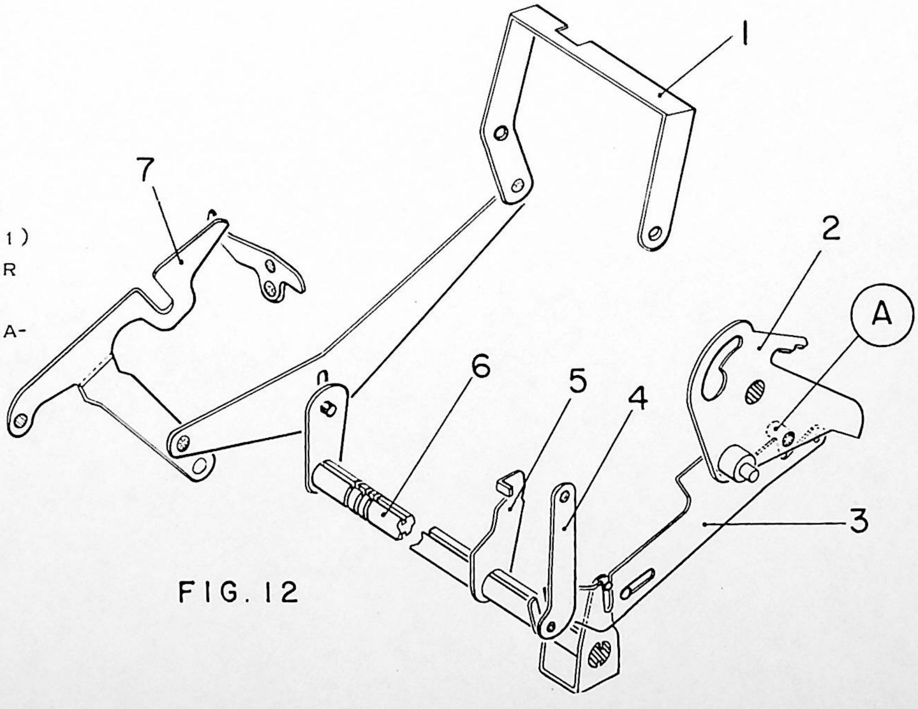


FIG. 12

RACKS AND RACK DRIVE

MAIN RACKS (2) (FIGURE 13) ARE DRIVEN ON HAND MACHINES BY MAIN RACK DRIVE ASSEMBLY VERY SIMILAR TO THAT ON POWER DRIVEN MACHINES, I.E., RACKS ARE MOTIVATED BY A PAIR OF YIELDABLE DRIVE ARMS (3) FOR EACH RACK (2) MOUNTED ON RACK CONTROL SHAFT (4). RACK CONTROL SHAFT (4) IS DRIVEN BY TWO RACK DRIVE CONTROL LINKS (5) WHICH ARE ACTUATED FROM TWO MAIN RACK CONTROL CAM FOLLOWERS (1) AND TWO RACK DRIVE CAMS (6).

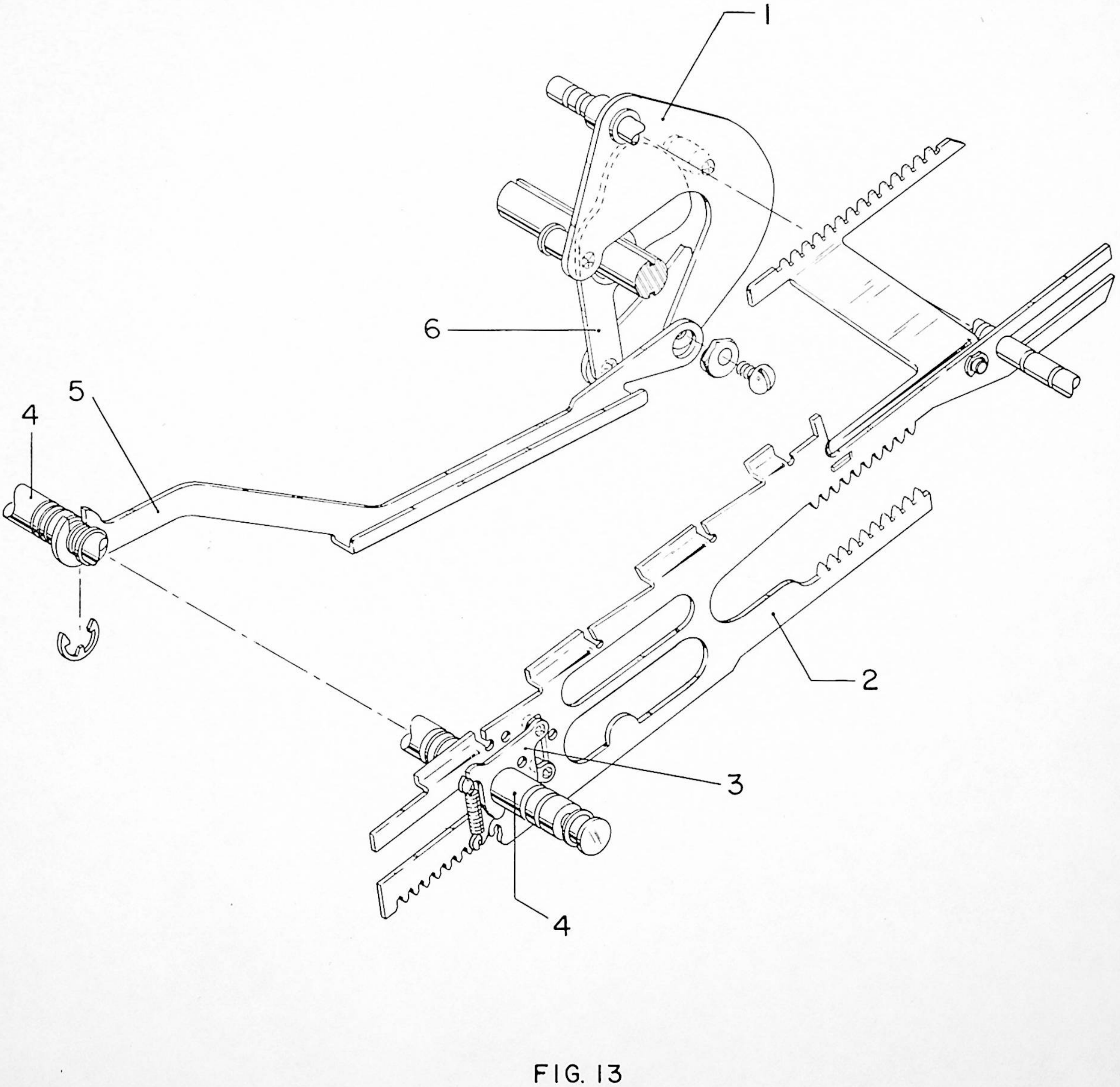


FIG. 13

SYMBOL CONTROL

THE SYMBOL OFFSET RACK (1) (FIGURE 14) DRIVES A SPECIAL CAM GEAR (2) AND, ON EVERY ADD STROKE, TRAVELS TO A LIMIT ON RACK OUTSTOP BAR (7). THE CORRECT SYMBOL, I.E., (T),(S) OR (-) IS SELECTED BY TRAPEED STUD ON CONTROL KEY BELLCRANK BLOCKING TRAVEL OF SYMBOL RACK (4). SPECIAL CAM GEAR (2) IS DIFFERENT IN THAT LARGE DWELL FOR PRINTER LATCH (3) TO DROP INTO IS REVERSED. THIS ALLOWS PRINTING LEVER TO BE LATCHED ON ADD STROKES WHEN CAM GEAR (2) IS TURNED TO ITS LIMIT, AS SHOWN.

THE SYMBOL RACK (2) IS PULLED FORWARD BY SYMBOL RACK DRAW SPRING (5) CONNECTED BETWEEN RACK (2) AND RACK CONTROL SHAFT (6).

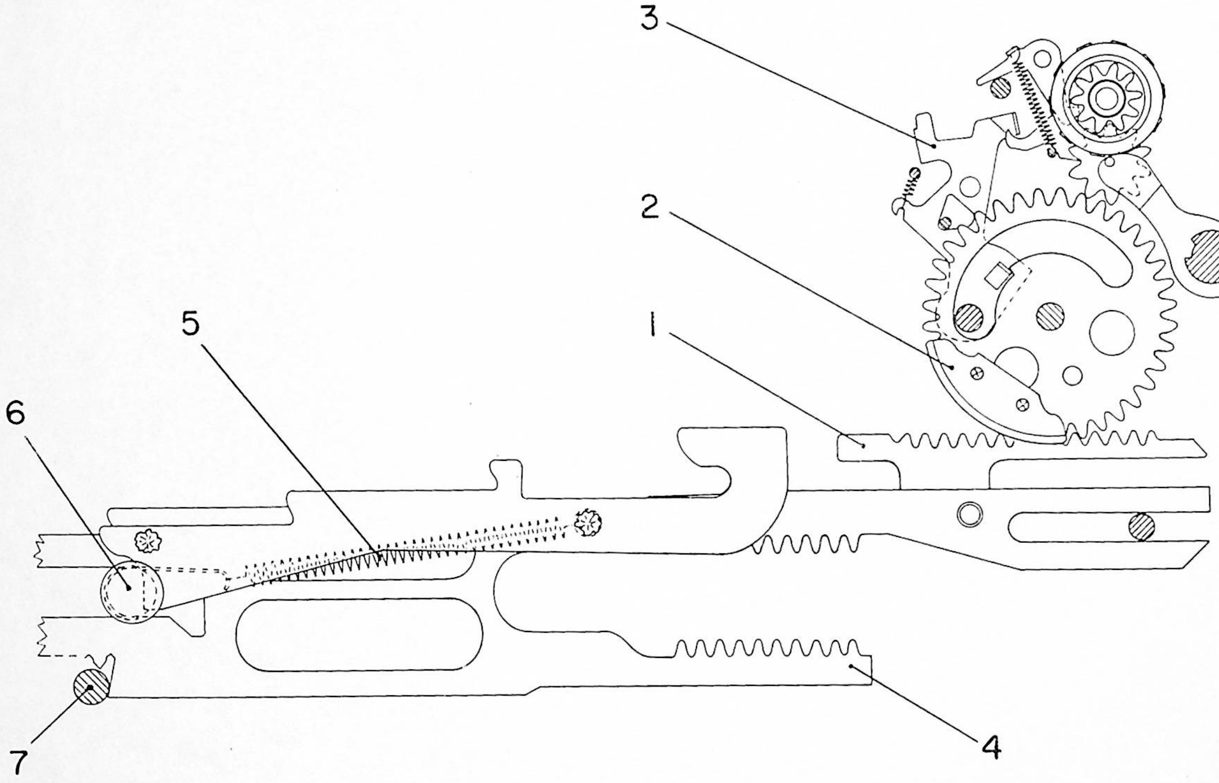


FIG. 14

POWER AND ITS TRANSMISSION

HANDLE DRIVE

HAND MODEL ADDING MACHINES RECEIVE THEIR MOTIVE POWER FROM A MANUALLY OPERATED LEVER. HANDLE OPERATION IMPARTS A RECIPROCATING MOTION TO THE MAIN CONTROL SHAFT (4) (FIGURE 15) THRU HANDLE DRIVE BAIL AND LINK (5) AND FULL STROKE SECTOR (3). SPRING (1) ATTACHED TO HANDLE DRIVE BAIL AND LINK (5) RESTORES HANDLE TO ITS STARTING POSITION AFTER A FULL MANUAL STROKE. A NON-BACK-UP PAWL (2) WHICH DETENTS ON FULL STROKE SECTOR (3) PREVENTS HANDLE FROM RETURNING AFTER AN OPERATION IS STARTED UNLESS A FULL STROKE IS COMPLETED AND, LIKEWISE, INSURES A FULL RETURN STROKE. THE PURPOSE OF STUD "A" IS TO LIMIT FULL STROKE SECTOR (3) AT NORMAL POSITION AND WHEN HANDLE IS PULLED FORWARD.

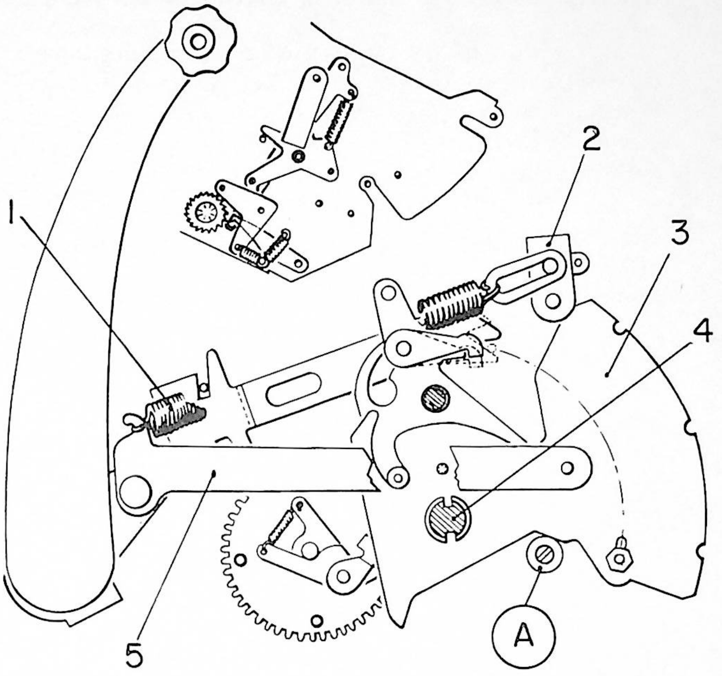


FIG. 15

GOVERNOR

A GOVERNOR DRUM AND MOUNT (1) (FIG. 16) COMPOSED OF GOVERNOR DRIVE GEAR (6), GOVERNOR DISC (2), TWO GOVERNOR BRAKE SHOES (3) AND TWO GOVERNOR WEIGHTS (4), NORMALLY INACTIVATED BY TWO COMPRESSION SPRINGS (5), LIMITS HANDLE PULL TO SAFE OPERATING SPEEDS. GOVERNOR IS GEARED THROUGH GOVERNOR INTERMEDIATE GEAR (7) TO GOVERNOR DRIVE SECTOR (8) ON MAIN CONTROL SHAFT. GOVERNOR WEIGHTS (4), WHEN CENTRIFUGALLY DISPLACED, OVERPOWER COMPRESSION SPRINGS (5) AND ACTUATE GOVERNOR BRAKE SHOES (3) WHEN EXCESSIVE TORQUE IS APPLIED ON GOVERNOR DRIVE GEAR (6). TWO STUDS "A" ON GOVERNOR WEIGHTS (4) ENGAGED WITH GOVERNOR DISC (2) REDUCE BRAKING ACTION BY BLOCKING OUT GOVERNOR WEIGHTS (4) ON SECTOR RETURN STROKE.

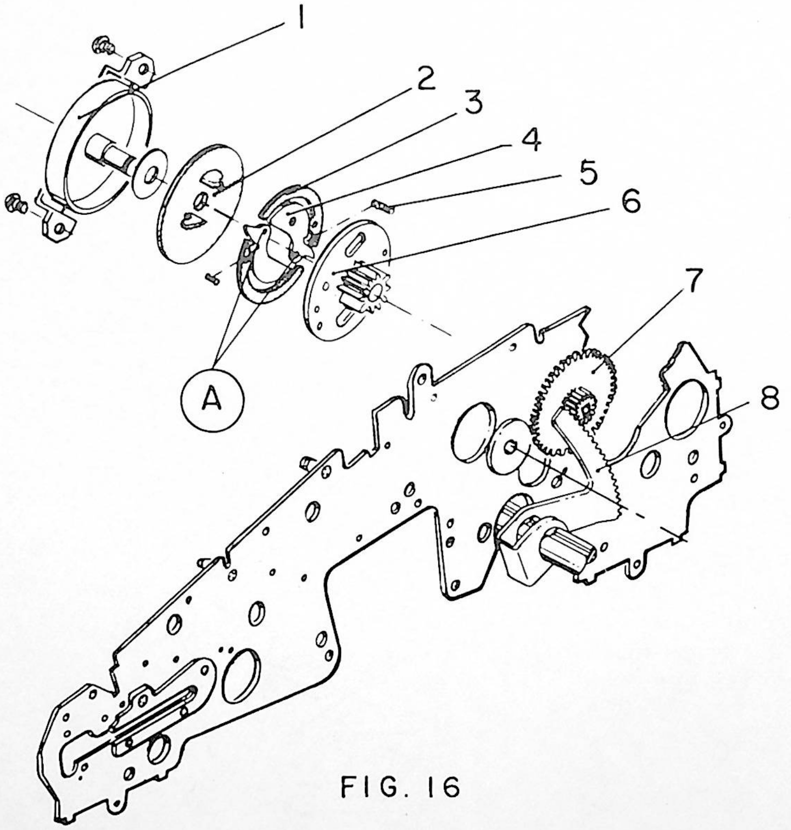


FIG. 16

MAIN CONTROL SHAFT CAMS AND FOLLOWERS

A LEVER AND CAMS OF VARIOUS CONTOURS ARE ALSO ASSEMBLED ON MAIN CONTROL SHAFT TO IMPART THE REQUIRED MOTION, AT THE PROPER TIME, TO THEIR RESPECTIVE MECHANISMS THROUGH A CAM AND FOLLOWERS PIVOTING ON MAIN RACK SUPPORT SHAFT. THESE CAMS, AND THEIR RELATED FOLLOWERS, ARE ILLUSTRATED AND IDENTIFIED BELOW IN CONSECUTIVE ORDER AS VIEWED FROM THE RIGHT.

THE FULL STROKE SECTOR (2) (FIGURE 17), IN ADDITION TO DRIVING AND ENFORCING FULL OPERATION OF THE MAIN CONTROL SHAFT (3), ACTS AS A CAM TO ACTUATE THE ACCUMULATOR POSITIONING CONTROL CAM FOLLOWER (1) AND ALSO DRIVES ACCUMULATOR TRANSFER MECHANISM (4). TWO FUNCTIONS ARE PERFORMED FROM THE ACCUMULATOR POSITIONING CONTROL FOLLOWER (1) - NAMELY, ACCUMULATOR POSITIONING AND ZERO STOP ACTUATION.

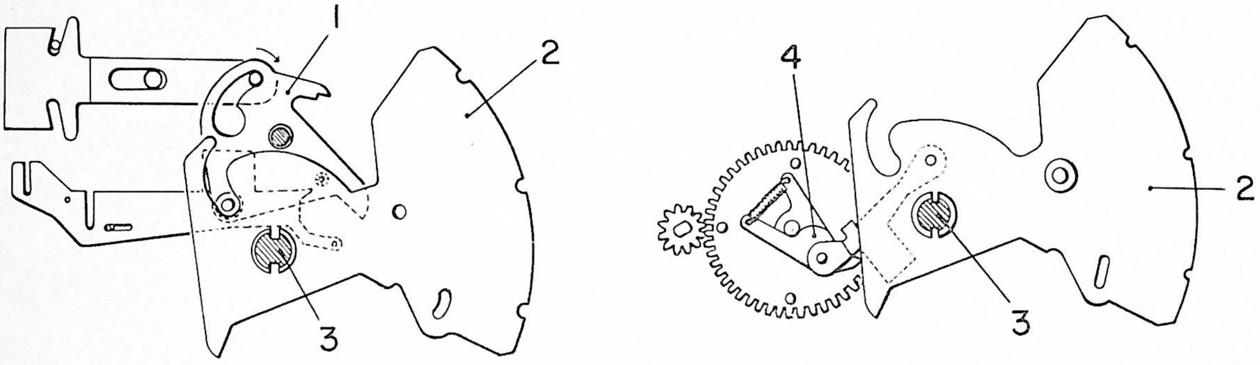


FIG. 17

AUTOMATIC KEY RELEASE CAM (3) (FIGURE 18) IS EQUIPPED WITH A YIELDABLE CAMMING ARM (2) WHICH ACTUATES THE AUTOMATIC KEY RELEASE LINK (1) WHEN IT CONTACTS MAIN CONTROL SHAFT (4) AS FULL STROKE SECTOR RETURNS TO ITS HOME POSITION.

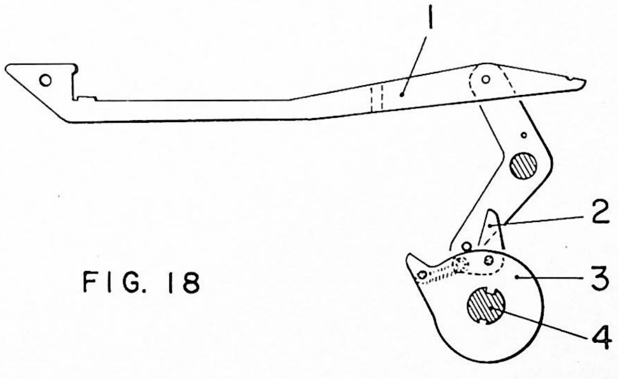


FIG. 18

RACK DRIVE CAMS (3) (FIGURE 19) DRIVE RACK DRIVE UNIT THROUGH THEIR MAIN RACK CONTROL CAM FOLLOWERS (4) AND RACK DRIVE CONTROL LINKS (2). LEVER (1) ON RIGHT RACK DRIVE CAM (3) IS LINKED DIRECTLY TO THE PRINTER CONTROL LINK AND INITIATES THE ACTION REQUIRED TO RESTORE THE PRINTING LEVERS AFTER PRINTING.

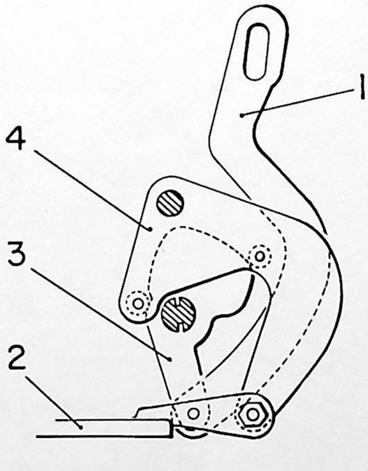


FIG. 19

THE PRINTER CAM GEAR LINER CONTROL LEVER (4)(FIGURE 20) ON MAIN CONTROL SHAFT DRIVES LINER CONTROL CAM (3) WHICH ACTUATES CAM GEAR LINER (5) THROUGH RELEASE LATCH ACTUATING SHAFT (6) AND LINER CONTROL LINK (2).

LINER RETAINS AMOUNT IN CAM GEARS (1) DURING PRINTING OPERATIONS.

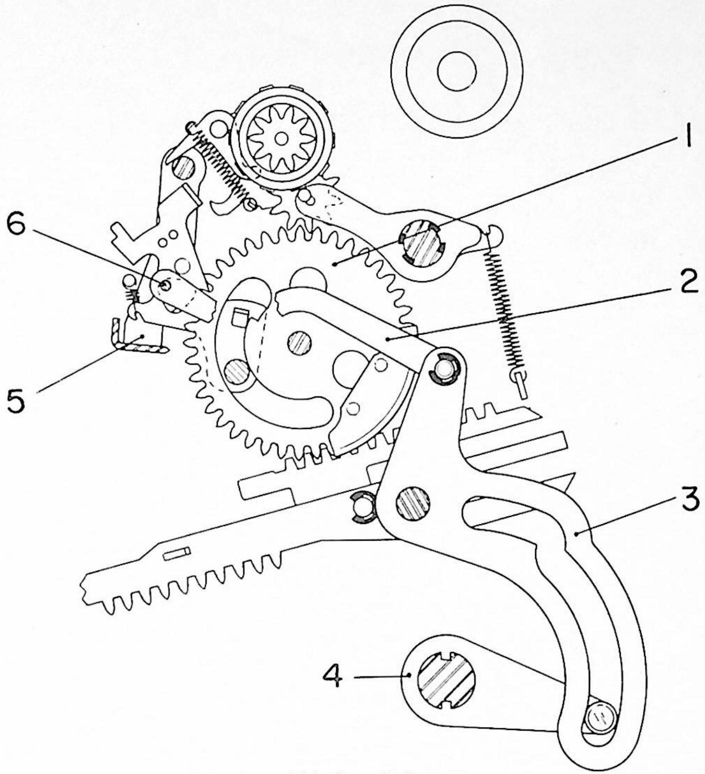


FIG. 20

THE RIBBON AND PAPER SPACE CAM (2) (FIGURE 21) ACTUATES THE PLATEN INDEXING CAM FOLLOWER (3) WHICH INITIATES RIBBON FEED AND PAPER SPACING THROUGH RIBBON FEED PAWL (1) AND PLATEN SPACING LINK (4).

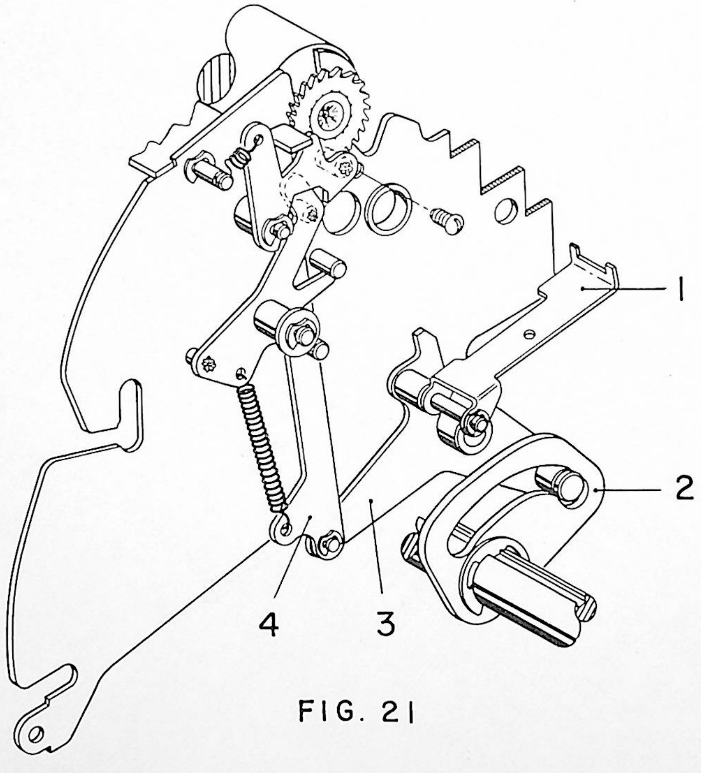


FIG. 21

INSPECTIONS AND ADJUSTMENTS

1. TRANSFER CAM SHAFT (4) (FIGURE 22) SHOULD BE POSITIONED SO SECOND TRANSFER CAM (4A) FROM LEFT IS POINTING NEAREST DIRECTLY FORWARD AND TWO STUDS "A" ON TRANSFER INTERMEDIATE GEAR (1) ARE ALIGNED HORIZONTALLY.

   ADJ. DISENGAGE TRANSFER INTERMEDIATE GEAR (1) AND TURN TRANSFER SHAFT (4) AND INTERMEDIATE GEAR (1) TO DESIRED POSITIONS AND RE-MESH.

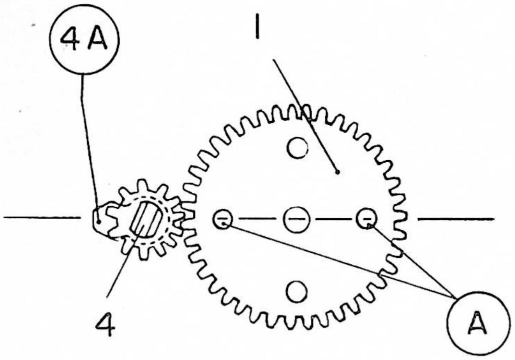


FIG. 22

Should Drive to within

2. ~~MAIN RACKS (2) (FIGURE 23) SHOULD CLEAR~~ MAIN RACK SUPPORT SHAFT (1) ~~BY~~ .002" TO .005" WHEN MACHINE IS IN NORMAL POSITION.

   of a Limit

   ADJ. RE-POSITION ECCENTRICS (3) IN RACK DRIVE CONTROL LINKS (5).

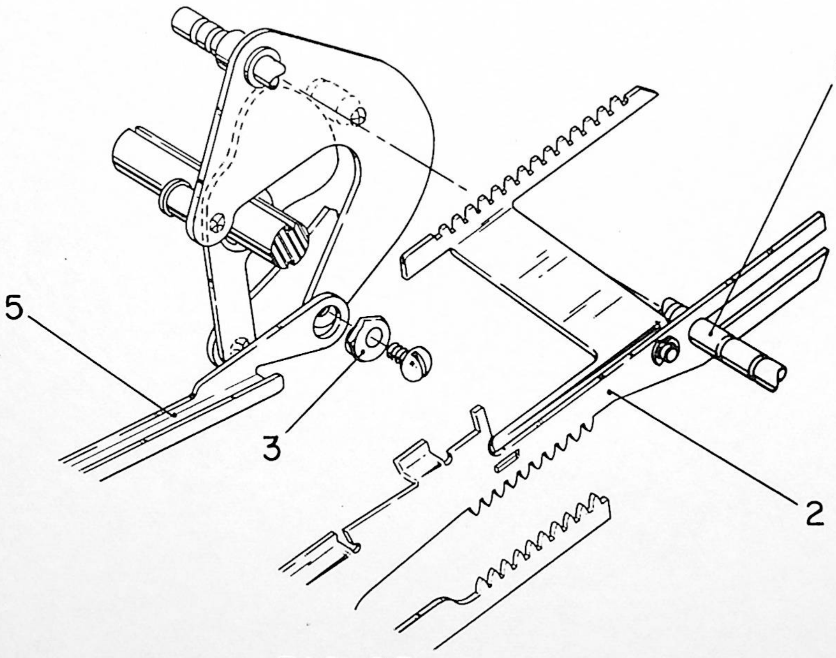


FIG. 23

3. ~~ACCUMULATOR RESTORE LIVE TIP STUD "B" (FIGURE 24) ON FULL STROKE SECTOR (6) SHOULD DRIVE ACCUMULATOR RESTORE LIVE TIP (5) FAR ENOUGH TO RELEASE ACCUMULATOR CONTROL LATCH (4) FROM ACCUMULATOR POSITIONING CONTROL CAM (3) AND RESTORE ACCUMULATOR SECTION TO NEUTRAL POSITION BEFORE NON-BACK-UP PAWL (2) RELEASES FROM FULL STROKE SECTOR (6) ON HANDLE FORWARD STROKE.~~

ADJ. REPOSITION ACCUMULATOR RESTORE LIVE TIP STUD "B" IN FULL STROKE SECTOR (6).

To restore accumulator without driving to a limit

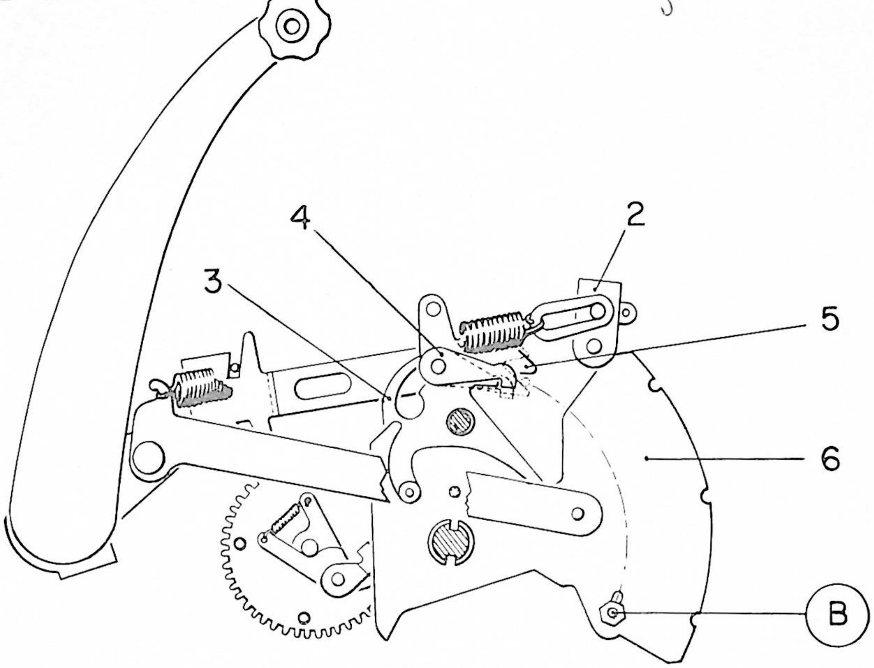


FIG. 24

4. WITH TOTAL OR SUB-TOTAL KEY DEPRESSED, HANDLE ALL THE WAY FORWARD, ZERO STOPS (5) (FIGURE 25) SHOULD FULLY BLOCK EARS ON RACK GEARS AND ZERO STOP ACTUATING LINK (3) SHOULD HAVE .010" FURTHER FORWARD MOVEMENT.

ADJ. TORQUE ZERO STOP RETURN ARM (1). ADJUST ONLY WITH MACHINE NORMAL.

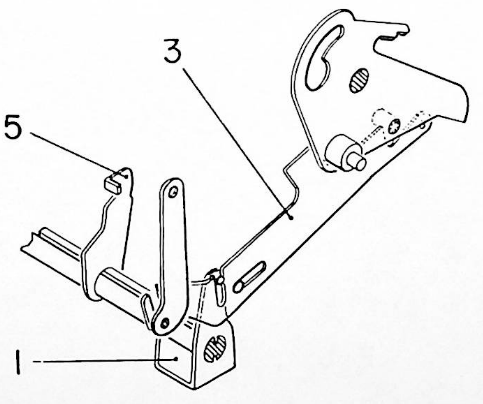


FIG. 25

5. INTERMEDIATE GEARS (2A) (FIGURE 26) ON PRINTING LEVERS (2) MUST HAVE .004" TO .006" PLAY WITH CAM GEARS (3), MACHINE NORMAL.

ADJ. LOOSEN SCREW "A" AND ADJUST PRINTER CONTROL LEVER ECCENTRIC "B", KEEPING HIGH OF ECCENTRIC "B" ON TOP.

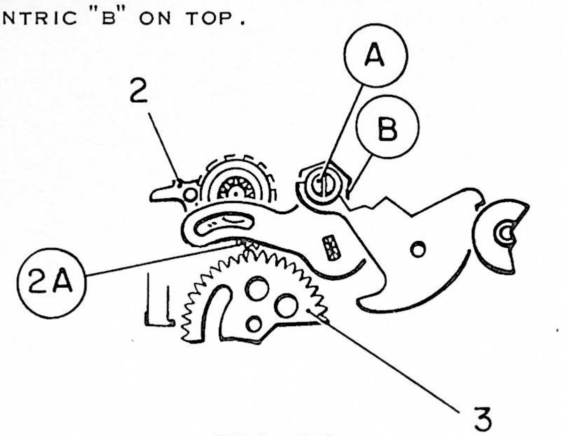


FIG. 26

6. PRINTING LEVERS MUST PRINT JUST BEFORE NON-BACK-UP PAWL (2) (FIGURE 27) DROPS OFF FULL STROKE SECTOR (3) AS HANDLE PULL IS COMPLETED.

ADJ. LOOSEN SCREW "A" AND ADJUST ECCENTRIC "B" ON PRINTER CONTROL CAM LINK (11).

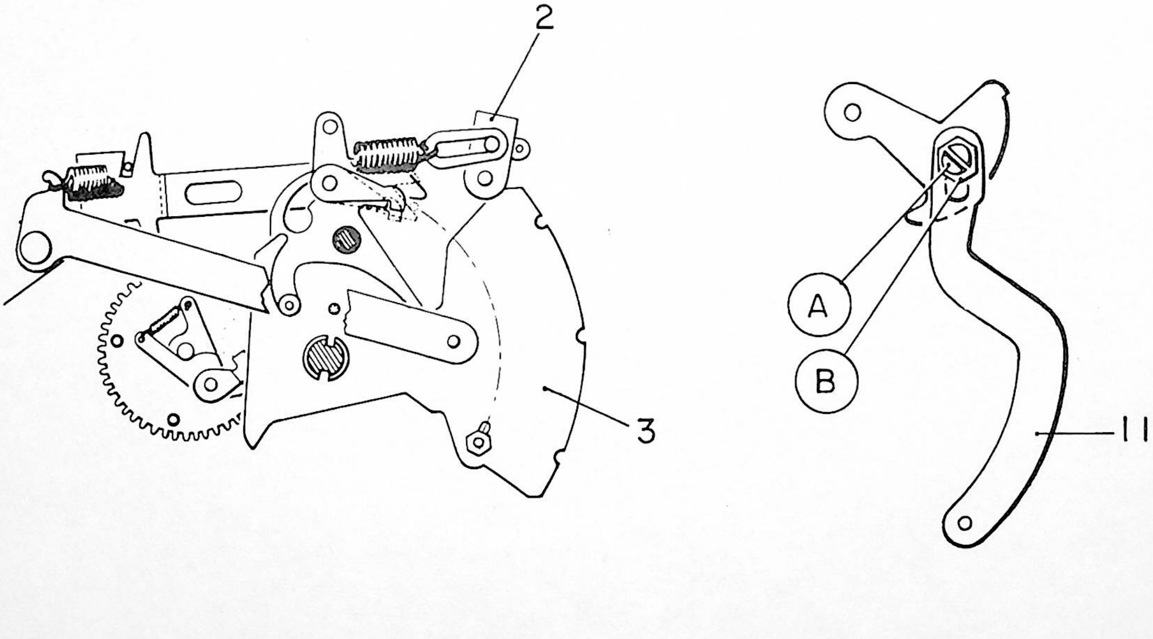


FIG. 27

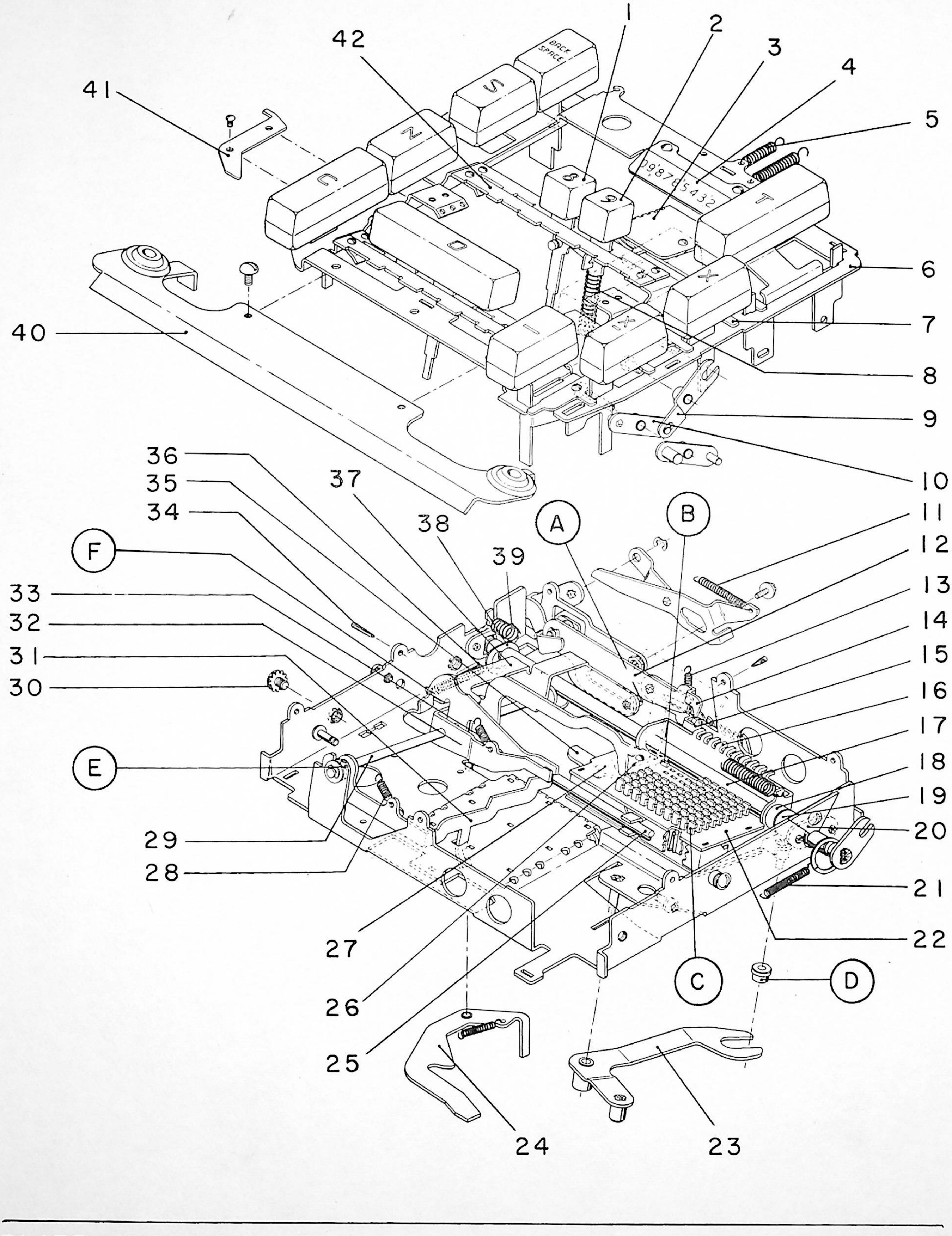


PLATE 25 KEYBOARD and PIN CARRIAGE

TG 57

Do not raise extension on T or ST - all other ops. requd.

TEN KEY MACHINE

KEYBOARD AND PIN CARRIAGE

KEYBOARD AND PIN CARRIAGE IN THIS MODEL ARE CONSTRUCTED IN A SINGLE REMOVABLE UNIT. KEYBOARD CONSISTS OF TEN AMOUNT KEYS (1) (PLATE 25) ZERO THROUGH NINE, AND CONTROL KEYS SUCH AS TOTAL, NON-ADD, ETC. CONSTRUCTED WITHIN AND DIRECTLY CONTROLLED BY AMOUNT KEYS AND CONTROL KEYS IS A MOVABLE PIN CARRIAGE (22). PIN CARRIAGE CONTAINS NINE ROWS OF MOVABLE STOP PINS "C", YIELDING ZERO STOP PIN "B" AND A FIXED ZERO STOP (35) TO LIMIT RACKS IN NORMAL OR ZERO POSITION. LAST ROW OF MOVABLE STOP PINS "C" IS FOR ZERO KEY AND FIRST ROW IS FOR NUMERAL EIGHT KEY. THERE IS NO STOP PIN FOR NUMERAL NINE KEY TO ACTUATE AS RACKS WILL LIMIT AT NINE POSITION ON MAIN RACK LOCK.

EACH AMOUNT KEY (1), EXCEPT NUMERAL NINE (2), CONTROLS AN AMOUNT KEY BAIL (32) WHICH IN TURN, DEPRESSES A STOP PIN "C" FOR ITS SELECTIVE POSITION AND ACTUATES THE ESCAPEMENT BAIL (31). NUMERAL NINE AMOUNT KEY (2) ACTUATES ONLY ESCAPEMENT BAIL (31).

IN NORMAL POSITION, PIN CARRIAGE (22) IS POSITIONED SO EXTREME LEFT ROW OF MOVABLE STOP PINS "C" IS LOCATED DIRECTLY UNDER EXTENSIONS OF AMOUNT KEY BAILS (32). WHEN AMOUNT KEY (1) IS DEPRESSED, THESE AMOUNT KEY BAILS WILL DEPRESS ANY PIN "C" SELECTED IN ANY GIVEN COLUMN OF PINS PRESENTED BY ESCAPEMENT OF PIN CARRIAGE (22). AT SAME TIME, AMOUNT KEY BAIL (32) WILL ACTUATE ESCAPEMENT BAIL (31) WHICH IS DIRECTLY UNDER ALL AMOUNT KEY BAILS AND, BY MEANS OF EAR "F", ACTUATES ESCAPEMENT CONNECTING ARM (37). ESCAPEMENT CONNECTING ARM (37) WILL THEN ACTUATE ESCAPEMENT ARM AND DETENT (12) BY MEANS OF STUD "A" WHICH IS CONTAINED BY FORK IN ESCAPEMENT ARM AND DETENT (12).

ESCAPEMENT ARM AND DETENT (12), MOUNTED ON STUD IN KEYBOARD FRAME, EMBODIES A FIXED DOG (14) AND A MOVABLE DOG (15). THESE DOGS ALTERNATELY ENGAGE AND RELEASE ESCAPEMENT RACK (16) ON PIN CARRIAGE FRAME. HALF-INCREMENT SPACING BETWEEN FACE OF FIXED DOG AND FACE OF MOVABLE DOG PLACES MOVABLE DOG UNDER TOOTH OF ESCAPEMENT RACK WHEN STUD "A" ON ESCAPEMENT CONNECTING ARM (37) ACTUATES ESCAPEMENT. AS ESCAPEMENT CONNECTING ARM (37) RELEASES ESCAPEMENT, SPRING (13) ON MOVABLE DOG YIELDS AND URGES MOVABLE DOG TO RESTORE AND ENGAGE NEXT ESCAPEMENT TOOTH TO RIGHT. PIN CARRIAGE WILL MOVE TO LEFT THROUGH SPRING (39). THIS OPERATION PLACES NEXT ROW OF MOVABLE STOP PINS DIRECTLY BENEATH EXTENSIONS OF AMOUNT KEY BAIL (32) IN ORDER THAT NEXT DIGIT MAY BE ENTERED IN KEYBOARD.

IT ALSO HAS EXPOSED THE FIRST RACK EXTENSION BY MOVING FIXED ZERO STOP (35) AND YIELDING ZERO STOP PIN "B" ONE COMPLETE SPACE TO LEFT. FOR EACH SUCCEEDING AMOUNT KEY DEPRESSION, FIXED AND YIELDING ZERO STOP WILL MOVE ONE SPACE TO LEFT AND PREVIOUSLY DEPRESSED STOP PINS WILL MOVE INTO ALIGNMENT WITH THEIR RESPECTIVE RACK EXTENSIONS. IN THIS MANNER, FIGURES WITH MORE THAN ONE DIGIT ARE ENTERED AS READ FROM LEFT TO RIGHT.

EACH AMOUNT KEY BAIL (32) HAS A RESTORE SPRING (33) WHICH RESTORES BOTH THE AMOUNT KEY BAIL (32) AND AMOUNT KEYSTEM (1). NUMERAL NINE AMOUNT KEY (2) IS RESTORED BY KEYSTEM COMPRESSION SPRING (8) AND ESCAPEMENT BAIL (31) IS RESTORED TO NORMAL THRU ITS SPRING (28).

THE PURPOSE OF YIELDING ZERO STOP PIN "B" IS TO ALLOW PIN CARRIAGE (22) TO CLEAR STOP PINS "C" IN FIRST COLUMN WITHOUT HAVING FIXED ZERO STOP (35) CHOKE OFF PIN CARRIAGE IN OVERTHROW POSITION.

PIN CARRIAGE SHIFTING MECHANISM

IN NORMAL POSITION, PIN CARRIAGE (22) IS POSITIONED .040" TO FRONT OF RACK EXTENSIONS TO PREVENT RACK EXTENSIONS FROM CONTACTING AND RESTORING ZERO PINS "C" WHEN RACK EXTENSIONS RAISE ON FIRST HALF OF CYCLE. THEREFORE, IT IS NECESSARY TO SHIFT PIN CARRIAGE (22) TO REAR AFTER RACK EXTENSIONS ARE RAISED TO PREVENT OVER-TRAVEL OF RACKS AND PARTIALLY ROTATING RACK GEARS CAUSING WRONG ADDITION. (PLATE 25)

PIN CARRIAGE (22) IS MOUNTED ON REAR PIN CARRIAGE SUPPORT SHAFT (17) AND IS FORKED OVER PIN CARRIAGE FRONT SHAFT (25). REAR SUPPORT SHAFT (17) HAS A FLAT ON EITHER END AND IS SUPPORTED IN HALF-MOON SLOTS ON KEYBOARD FRAME.

AS STUD "A" (FIGURE 1) ON MAIN RACK LOCK CAM FOLLOWER LINK (2) ROTATES PIN CARRIAGE ACTUATOR BAIL (1), STUD "B" IN BAIL (1) WILL ROTATE PIN CARRIAGE SUPPORT SHAFT (17) (PLATE 25)OFF FLATS IN KEYBOARD FRAME. THIS WILL SHIFT PIN CARRIAGE (22) .040" TO REAR OF MACHINE TOWARD RACK EXTENSIONS TO BLOCK RACKS.

WHEN MAIN RACK LOCK CAM FOLLOWER LINK (2) (FIGURE 1) MOVES FORWARD, STUD "B" ROTATES PIN CARRIAGE ACTUATOR BAIL (1) WHICH WILL ROTATE PIN CARRIAGE SUPPORT SHAFT (17) (PLATE 25)BACK ON FLATS IN KEYBOARD FRAME AND SPRINGS (21) AND (36) WILL HOLD PIN CARRIAGE (22) FORWARD TO NORMAL.

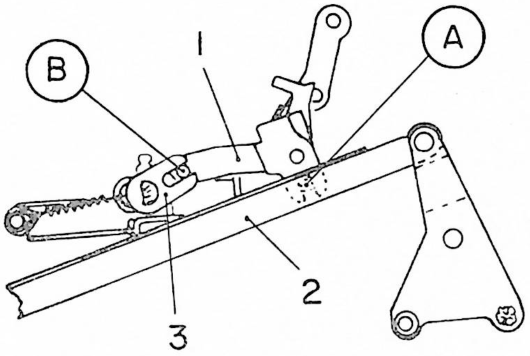


FIG. 1

ESCAPEMENT LOCK

ESCAPEMENT LOCK (24) IS PROVIDED TO ENABLE AN OPERATOR TO RIDE CIPHER KEY ON STEP-OVER MULTIPLICATION. ESCAPEMENT LOCK (24) WILL MOVE INTO NOTCH IN ESCAPEMENT BAIL (31) ON FIRST HALF OF MACHINE CYCLE THROUGH ACTUATION OF RACK STOP ACTUATING BAIL. THIS WILL HOLD ESCAPEMENT BAIL (31) AND ESCAPEMENT ARM AND DETENT (12) ACTUATED TO INSURE ESCAPING PIN CARRIAGE (22) ONE FULL SPACE TO LEFT AFTER RACK STOP ACTUATING BAIL RETRACTS RACK EXTENSIONS AND UNLOCKS ESCAPEMENT LOCK (24) FROM ESCAPEMENT BAIL (31) ON LAST HALF OF CYCLE.

PIN CARRIAGE RESTORING MECHANISM

IN NORMAL POSITION, HIGH CONTOUR OF PIN CARRIAGE RETURN CAM (5) (FIGURE 2) CONTACTS AND HOLDS PIN CARRIAGE RETURN CAM FOLLOWER (4) ROTATED. THIS HOLDS PIN CARRIAGE RETURN LINK (6) TOWARD REAR, LOADING SPRING (7). SPRING (9) HOLDS LINK (6) UP SO FORWARD END WILL BE IN POSITION TO CONTACT ROLL "A" ON PIN CARRIAGE RETURN ARM (8).

ON LAST HALF OF CAM SHAFT CYCLE, CAM FOLLOWER (4) LEAVES HIGH CONTOUR OF CAM (5) AND SPRING (7) URGES LINK (6) FORWARD TO CONTACT ROLL "A" AND ROTATE RETURN ARM (8), RESTORING PIN CARRIAGE (3) TO NORMAL POSITION. AS PIN CARRIAGE (3) RESTORES, IT PASSES OVER A BEVELED RESTORING PLATE IN KEYBOARD FRAME AND RESTORES ANY STOP PINS WHICH WERE DEPRESSED.

NEAR END OF LAST HALF OF CAM SHAFT CYCLE, HIGH CONTOUR OF CAM (5) WILL AGAIN CONTACT AND ROTATE CAM FOLLOWER (4), LOADING SPRING (7) AND HOLDING LINK (6) IN POSITION TO RESTORE PIN CARRIAGE ON NEXT STROKE. PIN CARRIAGE IS, THEREFORE, SPRING DRIVEN AND SPRING RESTORED WHICH WILL PREVENT ANY SERIOUS FRACTURE OR DISTORTION OF PARTS IN EVENT OF A MACHINE MALFUNCTION.

RUBBER BUMPER (2) ON RIGHT END OF REAR PIN CARRIAGE SUPPORT SHAFT (1) SERVES AS CUSHION FOR PIN CARRIAGE (3) AS IT RESTORES TO RIGHT TO PREVENT EXCESSIVE NOISE.

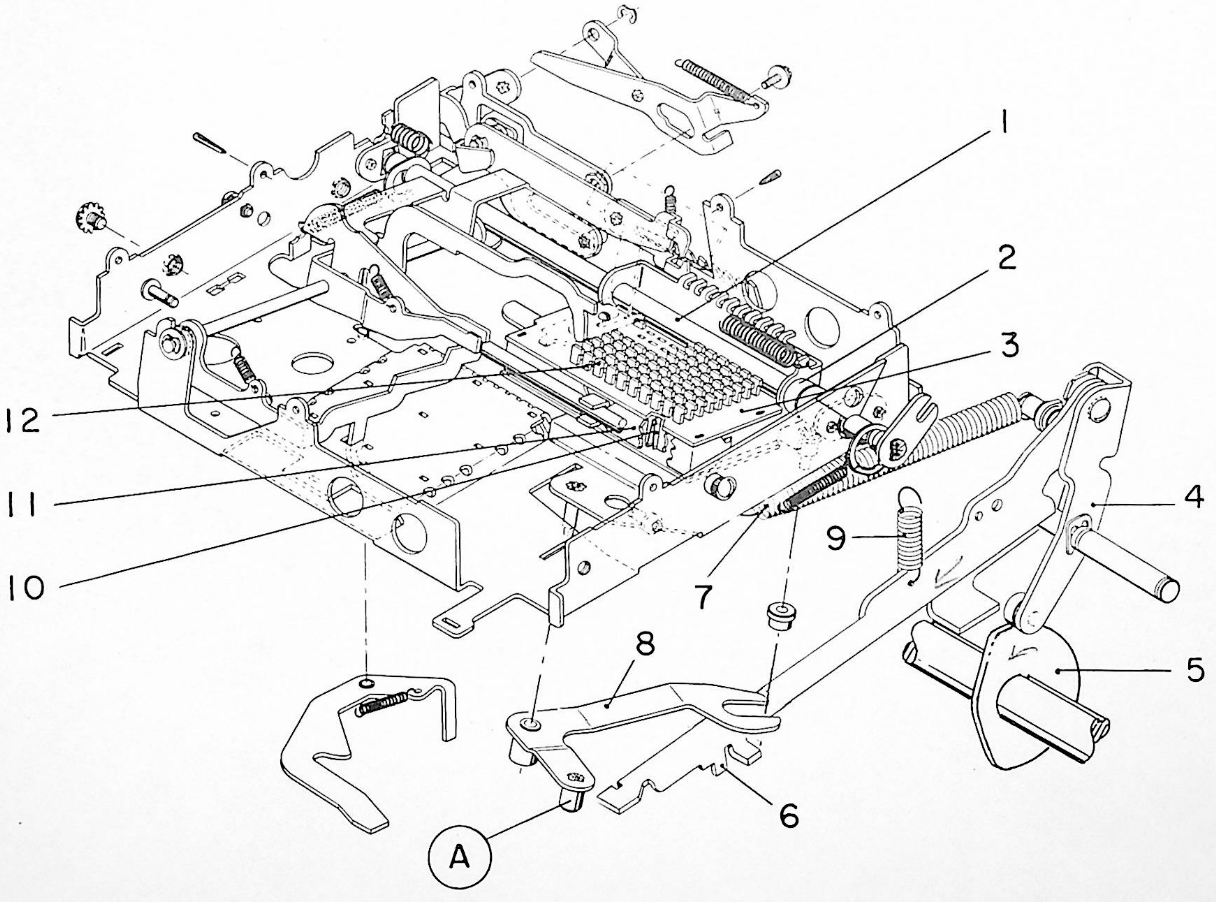


FIG. 2

BACKSPACE KEY

BACKSPACE KEY IS PROVIDED TO CORRECT FIGURES IN A FALSE ENTRY. IT IS ALSO USED ON MODELS EQUIPPED WITH DIVIDING EYE TO ENABLE OPERATOR TO BACKSPACE AFTER ADD-BACK STROKE INSTEAD OF RE-ENTERING LISTING AS REPEAT LATCH PREVENTS CLEARING OF PIN CARRIAGE.

WHEN BACKSPACE KEY (3) (FIGURE 3) IS DEPRESSED, BACKSPACE BAIL (4) WILL BE ROTATED, MOVING BACKSPACE LEVER (2) TO RIGHT. EAR "C" ON LEVER (2) WILL ENGAGE TOOTH OF BACKSPACE RACK (5), MOVING PIN CARRIAGE ONE SPACE TO RIGHT. AS PIN CARRIAGE MOVES TO RIGHT, MOVABLE DOG ON ESCAPEMENT ARM AND DETENT WILL BE CAMMED DOWN AND WILL ENGAGE NEXT TOOTH OF ESCAPEMENT RACK TO RETAIN PIN CARRIAGE ONE SPACE TO RIGHT. THIS ACTION WILL OCCUR ON EACH BACKSPACE OPERATION.

WHEN BACKSPACE KEY IS RELEASED, SPRING (1) WILL RESTORE BACKSPACE LEVER (2), BACKSPACE BAIL (4) AND BACKSPACE KEY (3).

BACKSPACE KEY (3) IS BLOCKED FROM DEPRESSION DURING MACHINE CYCLE THROUGH EXTENSION "A" ON CLUTCH CONTROL BAR. WHEN ANY CONTROL KEY IS DEPRESSED, CLUTCH CONTROL BAR WILL MOVE FORWARD, POSITIONING EXTENSION "A" IN PATH OF BACKSPACE BAIL (4) THUS BLOCKING BACKSPACE KEY (3) FROM DEPRESSION. LIKEWISE, IF BACKSPACE KEY (3) IS DEPRESSED, EXTENSION "B" OF BACKSPACE BAIL (4) WILL BE POSITIONED IN FRONT OF EXTENSION "A" TO BLOCK CLUTCH CONTROL BAR FROM MOVING FORWARD THUS BLOCKING FEATURE KEYS.

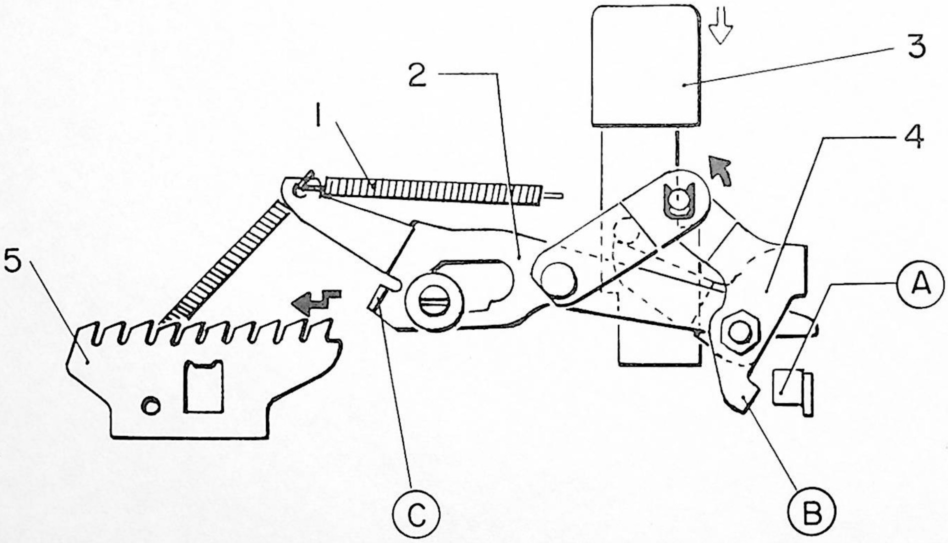


FIG. 3

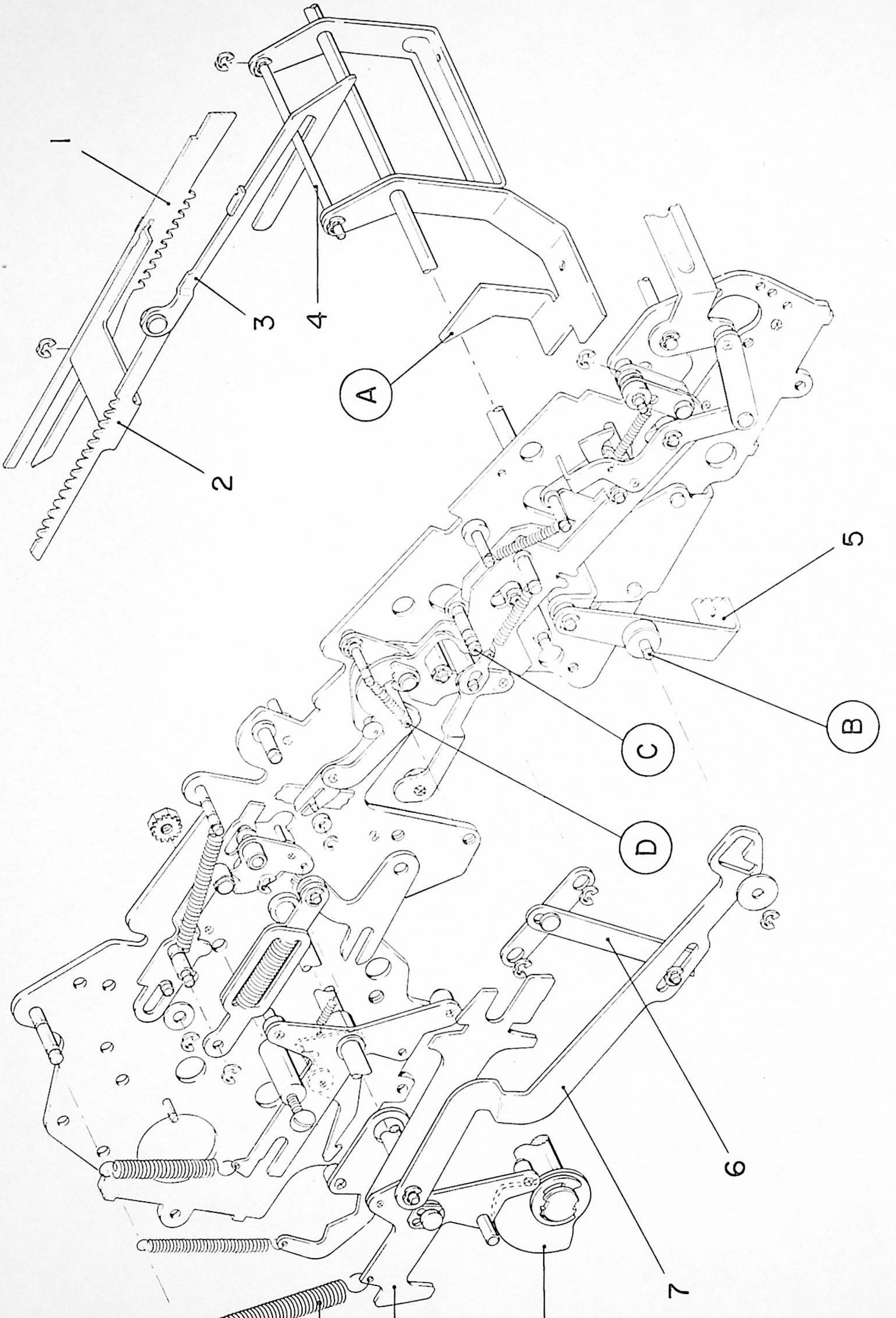


PLATE 26 RACK RETRACT MECHANISM

RACK EXTENSION RETRACT MECHANISM

MAIN RACKS IN TEN KEY MODELS ARE OF THREE-PIECE CONSTRUCTION. THEY CONSIST OF MAIN RACK (1) (PLATE 26), RACK OFFSET (2) AND RACK EXTENSION (3). RACK EXTENSION (3) IS INCORPORATED ON RACK TO COVER STOP PINS AND SENSE CORRECT FIGURE LISTED IN PIN CARRIAGE AND ALSO TO ENABLE MACHINE TO TOTAL OR SUB-TOTAL REGARDLESS OF POSITION OF PIN CARRIAGE.

ON LIST, NON-ADD OR CORRECTION OPERATIONS, RACK EXTENSIONS (3) ARE RAISED TO CONTACT DEPRESSED STOP PIN OR FIXED ZERO STOP IN PIN CARRIAGE. AS TOTAL CONTROL CAM FOLLOWER (9) IS ROTATED BY TOTAL CAM (8) ON FIRST HALF OF CYCLE, RACK STOP BAIL ACTUATING AND CONNECTING LINK (7) IS PULLED TOWARD REAR OF MACHINE. FRONT OF LINK (7) HAS A VERTICAL SLOT WHICH IS ENGAGED WITH STUD "B" ON OUTER RACK STOP ACTUATING BAIL (5) AND WILL PULL LOWER PORTION OF BAIL (5) TO REAR. THIS WILL RAISE RACK EXTENSIONS (3) UP THROUGH SHAFT (4) TO CONTACT STOP PINS OR ZERO STOP IN PIN CARRIAGE. ON MACHINES WITH EXTRA CAPACITY TOTAL FEATURE, AN EXTENSION "A" ON LOWER PORTION OF BAIL (5) WILL BLOCK A STUD ON LAST RACK TO KEEP RACK FROM MOVING AS LAST RACK IS NOT EQUIPPED WITH RACK EXTENSION.

ON LAST HALF OF CAM SHAFT CYCLE, TOTAL CONTROL CAM FOLLOWER (9) WILL DROP OFF HIGH CONTOUR OF TOTAL CAM (8) AND SPRING (10) ON CAM FOLLOWER (9) WILL RESTORE LINK (7), BAIL (5), SHAFT (4) AND RACK EXTENSIONS (3) TO NORMAL.

ON TOTAL AND SUB-TOTAL OPERATIONS, EITHER TOTAL BELLCRANK STUD "D" OR SUB-TOTAL BELLCRANK STUD "C" WILL ACTUATE ZERO STOP LINK CONNECTOR (6) WHICH IS ENGAGED WITH LINK (7). THIS WILL MERELY LOWER LINK (7) SO UPPER OR HORIZONTAL SLOT WILL ALLOW LINK (7) TO MOVE WITHOUT ACTUATING BAIL (5). THIS PREVENTS RACK EXTENSIONS (3) FROM RAISING, ALLOWING RACKS TO TRAVEL UNDER STOP PINS OR FIXED ZERO STOP UNTIL LIMITED BY ZERO STOPS IN ACCUMULATOR. THUS, IT IS POSSIBLE TO TAKE A TOTAL OR SUB-TOTAL WITH PIN CARRIAGE OUT OF NORMAL POSITION.

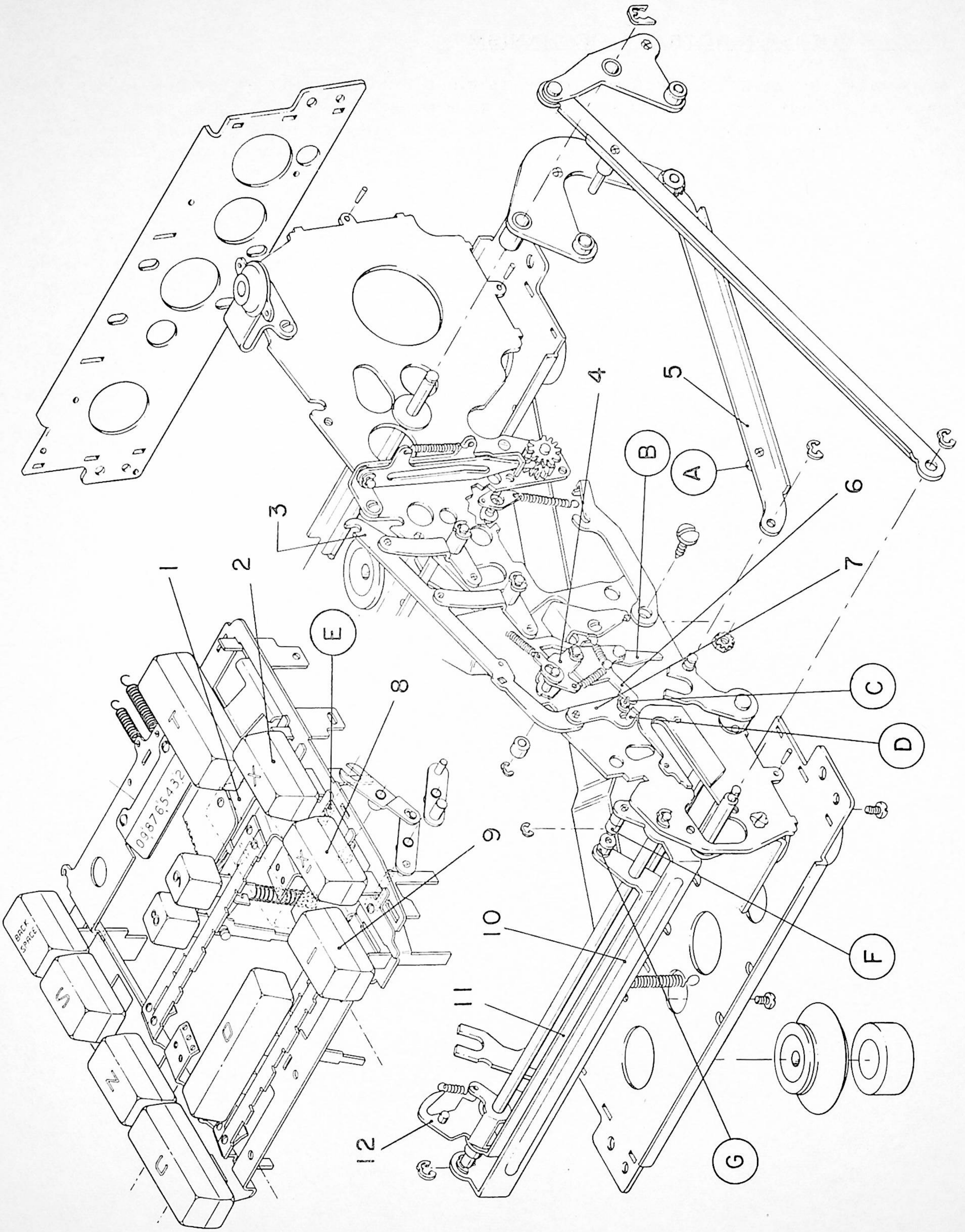


PLATE 27 FEATURE KEY MOTOR TRIP

FEATURE KEY MOTOR TRIP

MOTOR TRIP ON TEN KEY MODELS IS THE SAME AS FULL KEYBOARD MODELS EQUIPPED WITH POWER POSITIONING AS PREVIOUSLY EXPLAINED IN SECTION FOUR EXCEPT FOR THE DIFFERENT LINKAGE REQUIRED TO ACTUATE CLUTCH CONTROL BAR; NAMELY, ADD CONTROL BAIL (11) (PLATE 27) SUBTRACT CONTROL BAIL (10) AND CLEAR CONTROL ARM (12).

ADD KEY

WHEN ADD KEY (1) IS DEPRESSED, FRONT PORTION OF ADD KEY WILL CONTACT ROLL "G" AND ROTATE ADD CONTROL BAIL (11) AND, THROUGH LEFT EXTENSION OF BAIL (11) CONTACTING STUD IN CLUTCH CONTROL BAR, CLUTCH CONTROL BAR IS MOVED FORWARD TO TRIP MOTOR.

MULTIPLY KEY

WHEN MULTIPLY KEY (2) IS DEPRESSED, KEYSTEM WILL CONTACT ROLL "E" ON REAR EXTENSION OF ADD KEY, DEPRESSING ADD KEY WHICH, IN TURN, WILL ROTATE ADD CONTROL BAIL (11) TO TRIP MOTOR.

SUBTRACT AND REPEAT SUBTRACT KEYS

WHEN SUBTRACT KEY (9) OR REPEAT SUBTRACT KEY (8) IS DEPRESSED, KEYSTEMS WILL CONTACT ROLL "F" AND ROTATE SUBTRACT CONTROL BAIL (10) WHICH, IN TURN, THROUGH STUD "A" (FIGURE 4) SUBTRACT BELLCRANK (1) ACTUATES CLUTCH CONTROL BAR TO TRIP MOTOR.

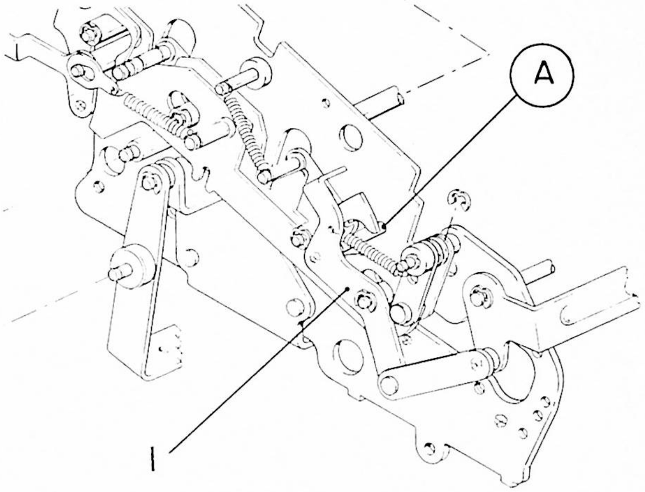


FIG. 4

CLEAR KEY

DEPRESSION OF CLEAR KEY (2) (FIGURE 5) ROTATES CLEAR ACTUATING ARM (3) WHICH ROTATES CLEAR CONTROL ARM (1), CAUSING EXTENSION "A" TO CONTACT STUD "B" AND MOVE CLUTCH CONTROL BAR (4) FORWARD TO TRIP MOTOR.

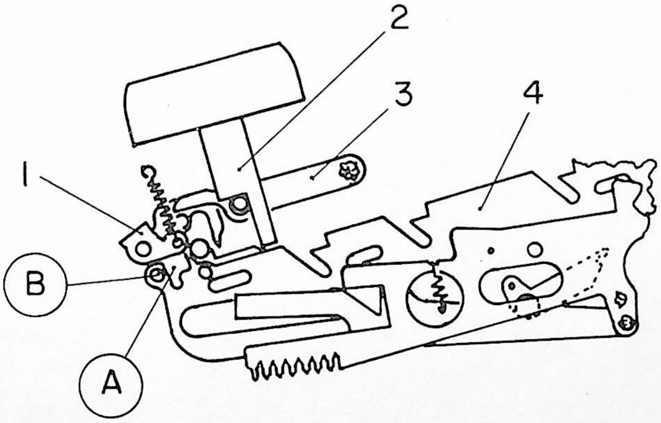


FIG. 5

MULTIPLY AND REPEAT SUBTRACT KEYS AND REPEAT LATCH

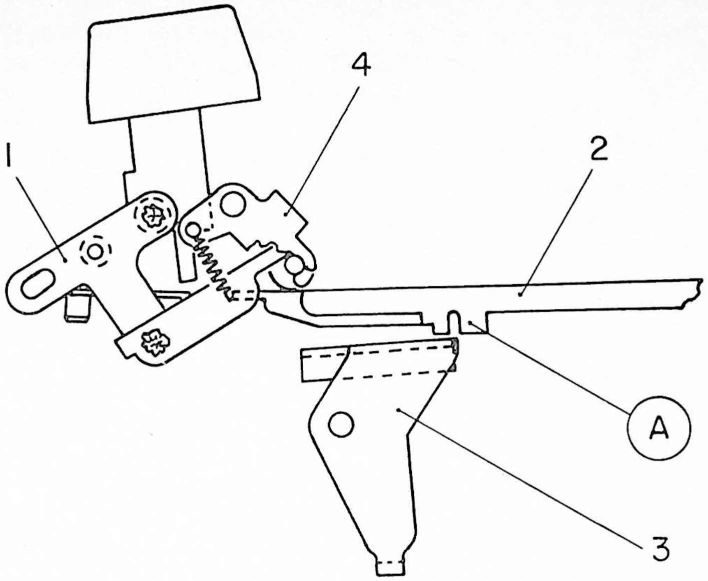


FIG. 6

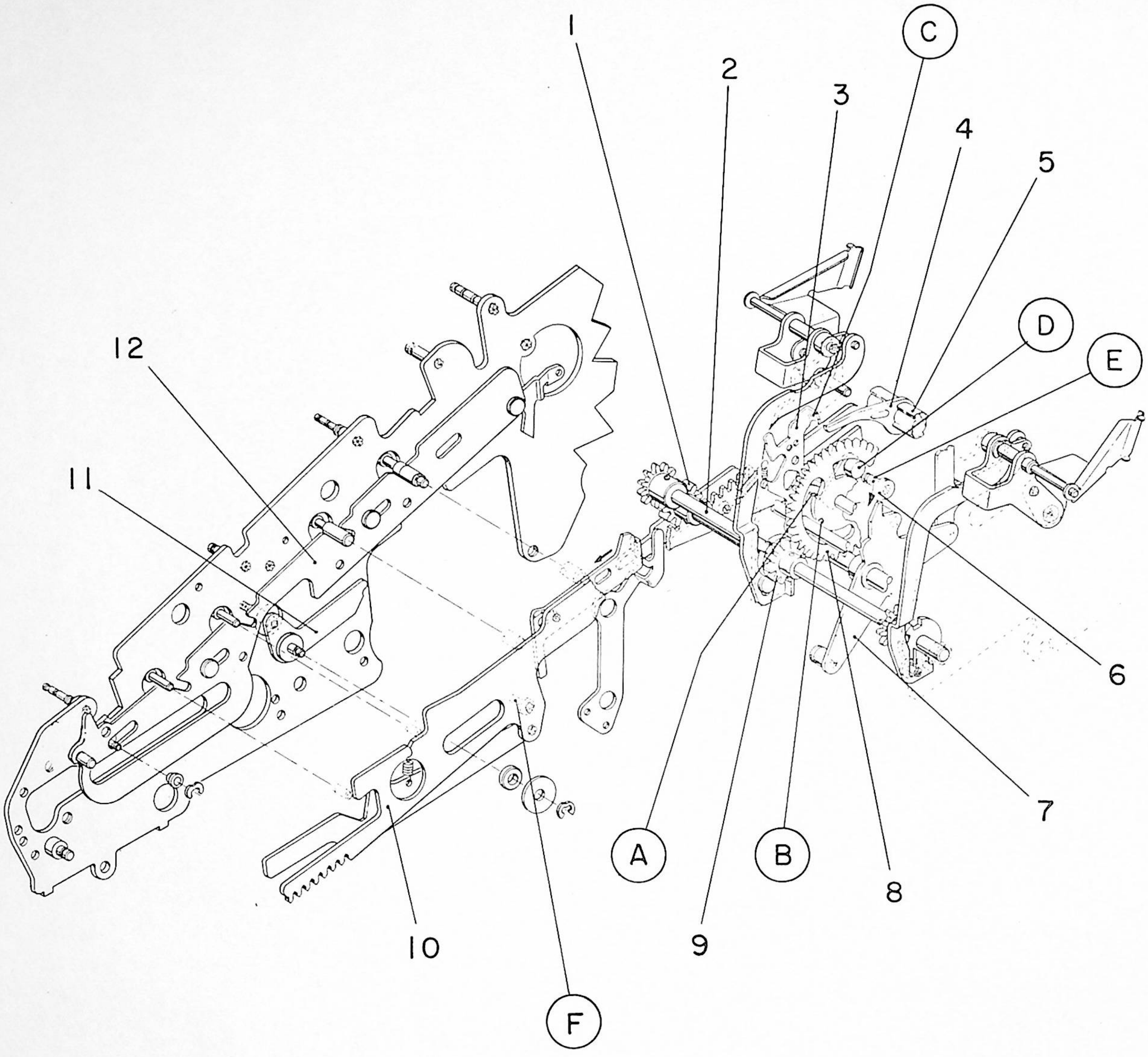
THE FUNCTION OF MULTIPLY KEY (2) AND REPEAT SUBTRACT KEY (8) (PLATE 27) IS TO DISABLE PIN CARRIAGE RESTORE MECHANISM WHEN THEY ARE DEPRESSED. WHEN MULTIPLY OR REPEAT SUBTRACT KEY IS DEPRESSED, REPEAT LEVER (1) (FIGURE 6) WILL ROTATE PIN CARRIAGE RETURN LINK POSITIONING ARM (4) DOWNWARD UNTIL IT CONTACTS PIN CARRIAGE RETURN LINK (2). THIS WILL DIRECT EAR "A" ON LINK (2) UNDER SHELF OF PIN CARRIAGE RETURN LINK GUIDE (3) WHEN LINK (2) LEAVES HIGH CONTOUR OF CAM. THIS PREVENTS LINK (2) FROM CLEARING PIN CARRIAGE.

MULTIPLY KEY OR REPEAT SUBTRACT KEY WOULD NORMALLY, IF RELEASED BEFORE HALF-CYCLE, PERMIT POSITIONING ARM (4) TO RAISE BEFORE DIRECTING LINK (2) UNDER SHELF ON GUIDE (3). A REPEAT LATCH MECHANISM IS PROVIDED TO PREVENT THIS.

AS POSITIONING ARM (4) (PLATE 27) WAS ROTATED, IT, IN TURN, ROTATED REPEAT LATCH (6) FORWARD TO LATCH ON PIVOT STUD "C" FOR REPEAT LATCH TOTAL RELEASE ARM (7). AS MAIN RACK CONTROL CAM LINK (5) MOVES TO FRONT OF MACHINE, STUD "A" BY-PASSED YIELDING LIVE TIP "B" ON LATCH (6). ON LAST HALF OF CAM SHAFT CYCLE, STUD "A" ON LINK (5) CONTACTS LIVE TIP "B" ON LATCH (6) UNLATCHING IT FROM PIVOT STUD "C" FOR TOTAL RELEASE ARM (7). IF MULTIPLY KEY (2) OR REPEAT SUBTRACT KEY (8) IS HELD DOWN PAST THIS POINT IN CAM SHAFT CYCLE, LATCH (6) WILL BE PERMITTED TO RELATCH PIVOT STUD "C" FOR TOTAL RELEASE ARM (7). THIS CONDITION WOULD THEN CAUSE A REPEAT OPERATION ON NEXT OPERATION UNLESS IT WAS A TOTAL OPERATION. THIS PERMITS RETENTION OF AMOUNT IN PIN CARRIAGE FOR ADD-BACK WHEN DIVIDING OR STEP-OVER ON MULTIPLICATION.

IF TOTAL KEY IS DEPRESSED, TOTAL KEY BELLCRANK CONNECTING LINK (3) IS URGED FORWARD, ROTATING TOTAL RELEASE ARM (7) AND, THROUGH EAR "D", UNLATCHES REPEAT LATCH (6) FROM STUD "C". THIS WILL PERMIT PIN CARRIAGE TO RESTORE TO NORMAL ON TOTAL OPERATION.

THIS MECHANISM, PLUS RETRACTABLE RACK EXTENSIONS, ELIMINATES THE NECESSITY OF A TWO-CYCLE TOTAL AFTER REPEAT OPERATIONS.


C
D
E
A
B
F

CLEAR KEY AND PRINTER BLOCKING MECHANISM

THIS MECHANISM HAS THREE FUNCTIONS: NAMELY (1) ACTUATE CLUTCH CONTROL BAR (12) (PLATE 28) TO CYCLE MACHINE AND CLEAR PIN CARRIAGE; (2) BLOCK ACCUMULATOR CONTROLS IN NON-ADD TO PREVENT ACCUMULATION IN RACK GEARS AND (3) HOLD SYMBOL STOP BELL-CRANK (11) ABOVE STUD "F" IN SYMBOL RACK (10) TO PERMIT SYMBOL RACK (10) TO FULLY DRIVE THE LENGTH OF ITS MOUNTING SLOT TO ACTUATE PRINTING BLOCK MECHANISM. CLEAR MECHANISM THUS CLEARS AN ERRONEOUS ENTRY FROM PIN CARRIAGE WITHOUT PRINTING, INDEXING THE PAPER OR AFFECTING AMOUNT IN ACCUMULATOR.

AS CLEAR KEY (1) (FIGURE 7) IS DEPRESSED, IT CONTACTS STUD "A" IN CLEAR KEY ACTUATING ARM (2), DEPRESSING IT DOWNWARD. THIS CAUSES EXTENSION "G" OF ARM (2) TO CONTACT STUD "F" AND ROTATE CLEAR CONTROL ARM (5). AS CLEAR CONTROL ARM (5) ROTATES, EXTENSION "D" WILL CONTACT STUD "E" IN CLUTCH CONTROL BAR (3), DRIVING IT FORWARD TO START MOTOR. AT SAME TIME, EXTENSION "B" WILL TRAP STUD "C" IN ACCUMULATOR POSITIONING BAR (4) TO HOLD BAR (4) AND ACCUMULATOR POSITIONING LINK IN NON-ADD POSITION WHEN POWER TRIP MECHANISM ACTUATES ACCUMULATOR CONTROLS.

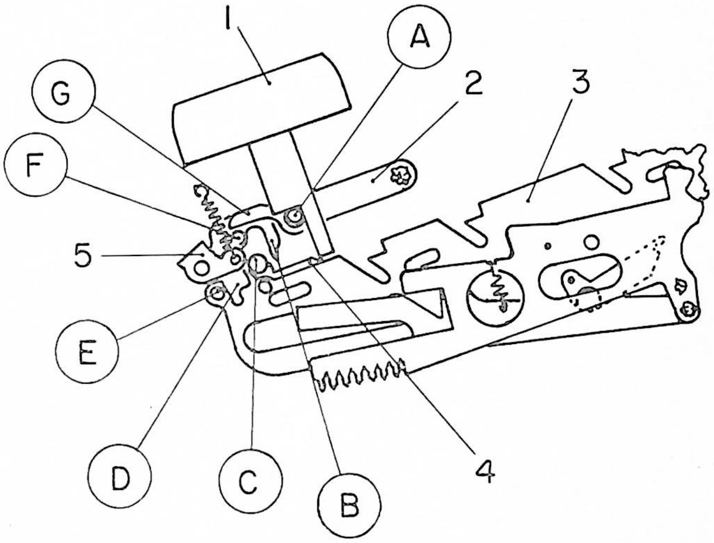


FIG. 7

ON FIRST HALF OF MACHINE CYCLE, SYMBOL CONTROL RACK (10) (PLATE 28) WILL BE DRIVEN FORWARD, ROTATING SYMBOL INTERMEDIATE GEAR (1) AND SYMBOL CONTROL SHAFT (2). SYMBOL CONTROL SHAFT (2) WILL ROTATE PRINTER BLOCK CAM GEAR (8) CLOCKWISE THROUGH GEAR (9) CAUSING UPPER END OF SLOT IN REAR OF CAM GEAR (8) TO CONTACT STUD "D" IN PLATEN INDEXING CAM FOLLOWER BLOCK (6), LOWERING STUD "E" IN PATH OF PLATEN INDEXING CAM FOLLOWER (7) THUS PREVENTING PAPER SPACING AND RIBBON FEEDING.

ALSO, AS CAM GEAR (8) IS ROTATED, NOTCH "B" IN FRONT SLOT OF GEAR (8) WILL BE POSITIONED IN PATH OF EAR "A" ON EXTREME LEFT PRINTER LATCH (3). AS CAM GEAR LINER MOVES INTO MESH WITH CAM GEARS, EAR "A" ON PRINTER LATCH (3) WILL MOVE INTO NOTCH "B" IN CAM GEAR (8) WHICH PERMITS EAR "C" TO LATCH OVER PRINTER BLOCK LEVER (4), PREVENTING PRINTER CONTROL SHAFT (5) FROM ROTATING WHICH, IN TURN, BLOCKS PRINTING LEVERS FROM PRINTING.

PRINTER BLOCK CAM GEAR (8) IS SET ONE INCREMENT OUT OF TIME IN NORMAL POSITION WHICH IS NECESSARY TO HOLD PRINTER LATCH (3) CLEAR OF PRINTER BLOCK LEVER (4) ON ALL OPERATIONS EXCEPT CLEAR KEY OPERATION.

AN INTERLOCK IS PROVIDED TO PREVENT CLEAR KEY (1) (FIGURE 8) FROM BEING DEPRESSED WHEN CLUTCH CONTROL BAR (3) IS ACTUATED BY ANY OTHER CONTROL KEY. THIS IS ACCOMPLISHED BY STUD "A" IN CLUTCH CONTROL BAR (3) BEING POSITIONED UNDER CLEAR CONTROL ARM (5) WHEN CLUTCH CONTROL BAR (3) MOVES FORWARD ON DEPRESSION OF A CONTROL KEY. THIS WILL BLOCK CLEAR CONTROL ARM (5) AND CLEAR ACTUATING ARM (2) WHICH, IN TURN, BLOCKS CLEAR CONTROL KEY (1) FROM DEPRESSION.

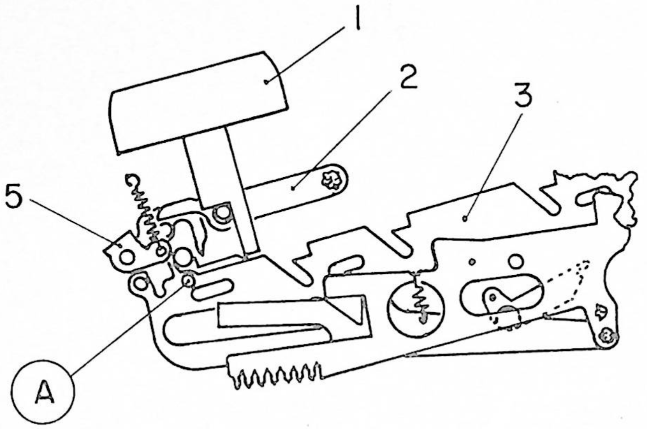


FIG. 8

REMOVAL OF KEYBOARD

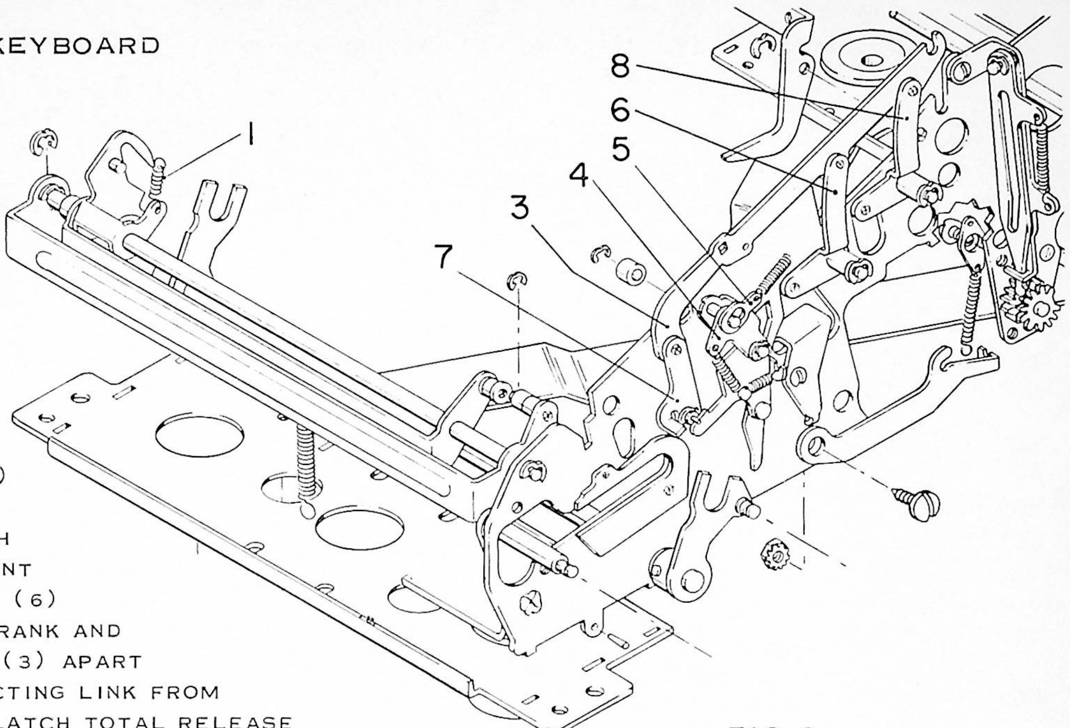


FIG. 9

REMOVE UPPER COVER GROMMET BRACKET (40) (PLATE 25) BY REMOVING TWO SCREWS.

UNHOOK TWO CAM GEAR LINER SPRINGS (5) FROM KEYBOARD. UNHOOK SPRING CLIP (5) (FIG. 9) FROM PIVOT STUD FOR REPEAT LATCH (4). SPRING FRONT TOTAL BELLCRANK (6) AND TOTAL BELLCRANK AND CONNECTING LINK (3) APART AND RAISE CONNECTING LINK FROM STUD ON REPEAT LATCH TOTAL RELEASE ARM (7). REMOVE KEEPERS FOR FRONT TOTAL BELLCRANK (6) AND REAR TOTAL BELLCRANK (8) AND MOVE THEM TO RIGHT ENOUGH TO DISENGAGE STUDS FROM TOTAL KEY.

REMOVE FOUR KEYBOARD MOUNTING SCREWS (30) (PLATE 25).

DISCONNECT REAR PIN CARRIAGE SHAFT ARM (2) (FIGURE 10) FROM STUD "B" ON PIN CARRIAGE ACTUATING BAIL (1) AND TURN EAR ON REAR SHAFT UP.

DISCONNECT CLEAR CONTROL ARM SPRING (1) (FIGURE 9) FROM UPPER KEYBOARD PLATE.

DISCONNECT PIN CARRIAGE RESTORE SPRING (7) (FIGURE 2) FROM CAM FOLLOWER (4).

RAISE LEFT EDGE OF KEYBOARD UP AND TURN KEYBOARD ONE-QUARTER TURN COUNTERCLOCKWISE. THIS WILL DISENGAGE ADD REPEAT LEVER (1) (FIGURE 6) FROM REPEAT BELLCRANK (4) AND ALSO DISENGAGE SUBTRACT KEYSTEM (9) (PLATE 27) FROM BETWEEN ROLLS "F" AND "G" ON ADD AND SUBTRACT BAILS (10) AND (11).

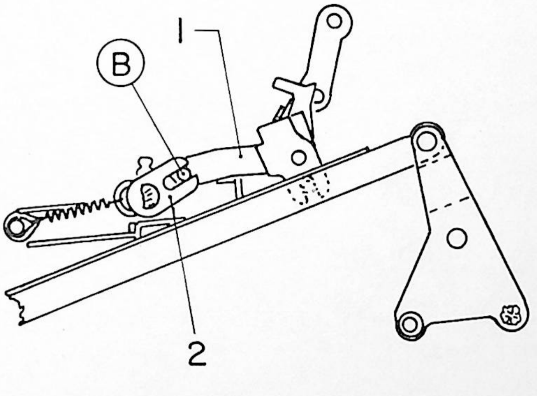


FIG. 10

DISASSEMBLY OF KEYBOARD

REMOVE RIGHT CONTROL KEY RETAINER (7) (PLATE 25) BY REMOVING TWO SCREWS.

REMOVE TOTAL, SUBTRACT, REPEAT AND REPEAT SUBTRACT KEYS.

REMOVE KEEPER FROM REAR ADD KEY BELLCRANK (9). REMOVE BELLCRANK (9) AND ADD KEY.

REMOVE TWO LEFT CONTROL KEY RETAINERS (41) AND REMOVE LEFT CONTROL KEYS.

UNHOOK PIN CARRIAGE RESTORE SPRING (7) (FIGURE 2) FROM EXTENSION ON BOTTOM KEYBOARD FRAME.

REMOVE EIGHT AMOUNT KEY RETAINERS (42) (PLATE 25) BY REMOVING SIXTEEN SCREWS.

NOTE: THESE RETAINERS ARE INTERCHANGEABLE.

REMOVE AMOUNT KEYS (1).

NOTE: DO NOT LOSE COMPRESSION SPRING (8) UNDER NUMERAL NINE KEY (2).

UNHOOK AMOUNT KEY BAIL SPRINGS (33) FROM UPPER KEYBOARD PLATE.

REMOVE AMOUNT KEY BAIL GUIDE COMB (3).

SPREAD AMOUNT KEY BAILS AND REMOVE FIXED ZERO PIN RETAINING SPRING (26), INDICATOR COVER (27) AND FIXED ZERO PIN "B".

DISCONNECT ESCAPEMENT RETURN SPRING (13) AND BACKSPACE RETURN SPRING (11) FROM UPPER KEYBOARD PLATE.

REMOVE SEVEN TOP PLATE TAPER PINS (34) NOTING LOCATION OF THREE SHORT PINS.

REMOVE TOP PLATE (6).

DISCONNECT PIN CARRIAGE DRAW SPRING (39).

REMOVE INSIDE KEEPER FROM AMOUNT BAIL PIVOT SHAFT (29) AND DRAW SHAFT THROUGH HOLE IN FRONT OF KEYBOARD FRAME.

NOTE: DO NOT LOSE BUSHING "E".

REMOVE ESCAPEMENT CONNECTING ARM (37).

REMOVE AMOUNT KEY BAILS (32) AND ESCAPEMENT BAIL (31).

REMOVE KEEPER FROM RIGHT END OF FRONT PIN CARRIAGE SHAFT (25) AND REMOVE SHAFT.

DISCONNECT PIN CARRIAGE SUPPORT SHAFT SPRING (36) FROM GOOSENECK ON LOWER KEYBOARD FRAME.

REMOVE LIMIT KEEPER ON REAR PIN CARRIAGE SUPPORT SHAFT (17).

REMOVE REAR PIN CARRIAGE SUPPORT SHAFT RETAINER (20) FROM OUTSIDE OF KEYBOARD FRAME.

WITHDRAW SHAFT (17) TO RIGHT, REMOVING SPRING RETAINER (38), NEOPRENE WASHER (18), LIMIT WASHER (19) AND PIN CARRIAGE (22).

NOTE: DO NOT LOSE ROLL "D" ON STUD IN BOTTOM OF PIN CARRIAGE FOR PIN CARRIAGE RETURN ARM (23).

REMOVE ESCAPEMENT ARM (12) BY REMOVING KEEPER.

REASSEMBLY OF KEYBOARD

REPLACE ESCAPEMENT ARM (12).

REPLACE PIN CARRIAGE IN FRAME WITH ROLL "D" ON STUD ON UNDERSIDE AND PIN CARRIAGE RETURN ARM (23) FORKED OVER ROLL "D".

INSERT REAR PIN CARRIAGE SUPPORT SHAFT (17) THROUGH RIGHT SIDE OF FRAME AND PLACE LIMIT WASHER (19) NEXT TO INSIDE OF FRAME AND NEOPRENE WASHER (18) BETWEEN PIN CARRIAGE EAR AND LIMIT WASHER (19). PUSH SHAFT (17) ON THROUGH PIN CARRIAGE AND REPLACE SPRING RETAINER (38) ON EXTREME LEFT END OF SHAFT (17).

REPLACE REAR SHAFT RETAINER (20) AND SCREW WITH NARROW END DOWN, MAKING SURE IT IS IN GROOVE IN SHAFT (17).

REPLACE PIN CARRIAGE LIMIT KEEPER ON REAR SHAFT (17).

REPLACE FRONT PIN CARRIAGE SUPPORT SHAFT (25) WITH KEEPER INSIDE RIGHT FRAME.

HOOK REAR SUPPORT SHAFT SPRING (36) BETWEEN RETAINER AND GOOSENECK ON LOWER KEYBOARD FRAME.

REPLACE ESCAPEMENT BAIL (31) AND AMOUNT KEY BAILS (32), MAKING SURE THEY ARE IN PROPER ORDER AND EXTENSIONS OF AMOUNT KEY BAILS (32) ABOVE ESCAPEMENT BAIL (31).

REPLACE ESCAPEMENT CONNECTING ARM (37) WITH STUD "A" IN FORK OF ESCAPEMENT ARM (12) AND FRONT PORTION OVERLAPPING EAR ON ESCAPEMENT BAIL (31).

INSERT PIVOT SHAFT (29) THROUGH HOLE IN FRONT OF KEYBOARD WITH BUSHING "E" ON INSIDE OF FRAME. WORK SHAFT (29) THROUGH HOLES IN BAILS (32). PLACE HUB ON BUSHING "E" THROUGH FRONT HOLE AND REPLACE KEEPER.

CONNECT PIN CARRIAGE DRAW SPRING (39).

REPLACE TOP PLATE (6) ON FRAME, BEING SURE MOVABLE DOG (15) ON ESCAPEMENT ARM (12) IS IN SLOT OF GUIDE UNDER INDICATOR PLATE (4).

REPLACE TAPER PINS (34), BEING SURE TO HAVE SHORT PINS IN FRONT AND REAR CENTER HOLES AND IN LEFT REAR HOLE.

REPLACE FIXED ZERO PIN "B", INDICATOR COVER (27), TENSION SPRING (26) AND SCREW.

REPLACE AMOUNT KEY BAIL COMB (3) WITH TWO SCREWS.

CONNECT AMOUNT KEY BAIL SPRINGS (33) AND ESCAPEMENT BAIL SPRING (28).

REPLACE REAR AMOUNT KEY RETAINER (42) FOR LAST ROW OF AMOUNT KEYS (1) WITH SLOTS TOWARD FRONT. REPLACE TWO SCREWS.

REPLACE #9 KEY (2) WITH COMPRESSION SPRING (8), #8 KEY WITH STUD IN STEM OVER END OF #8 BAIL (32) AND #7 KEY WITH EXTENSION OVER #7 BAIL (32). REPLACE FRONT RETAINER (42) FOR LAST ROW OF AMOUNT KEYS WITH TWO SCREWS.

REPEAT THIS PROCEDURE FOR ALL AMOUNT KEYS AND RETAINERS.

CONNECT ESCAPEMENT RETURN SPRING (13) AND BACKSPACE RETURN SPRING (11) TO UPPER KEYBOARD PLATE.

REPLACE BACKSPACE, SUB-TOTAL, NON-ADD AND CORRECTION KEYS, RETAINERS (41) AND FOUR SCREWS.

REPLACE ADD BAR. REPLACE REAR ADD CONTROL BELLCRANK (9) ON STUD IN FRAME WITH FORK IN BELLCRANK OVER ROLL IN ADD BAR AND HOLE OVER STUD IN FRONT BELLCRANK (10). BE SURE HOLE IN FRONT OF ADD BAR IS OVER STUD IN FRONT BELLCRANK (10).

REPLACE TOTAL, REPEAT, SUBTRACT AND REPEAT SUBTRACT KEYS WITH RETAINER (7) AND TWO SCREWS. MAKE SURE FINGERS ON RETAINER (7) POINT TO FRONT AND RIGHT SIDES.

REPLACE PIN CARRIAGE RESTORE SPRING (7) (FIGURE 2) ON EXTENSION UNDER KEYBOARD.

REPLACING KEYBOARD

WITH REAR END OF KEYBOARD RAISED AND TURNED ONE-QUARTER TURN, CAREFULLY POSITION SUBTRACT KEYSTEM BETWEEN ROLLS "F" AND "G" ON ADD AND SUBTRACT BAILS (10) AND (11) (PLATE 27). CAREFULLY LOWER KEYBOARD, PLACING ADD REPEAT LEVER (1) (FIGURE 6) OVER STUD IN REPEAT LATCH (4) AND PIN CARRIAGE RESTORE LINK SPRING (7) (FIGURE 2) POINTING TOWARD REAR. AT THIS TIME, PLACE RACK EXTENSIONS IN PROPER SLOTS IN GUIDE COMB ON BOTTOM KEYBOARD PLATE.

REPLACE FOUR KEYBOARD MOUNTING SCREWS (30) (PLATE 25).

PLACE STUDS IN FRONT AND REAR TOTAL KEY BELLCRANKS (6) AND (8) (FIGURE 9) IN HOLES IN TOTAL KEY. REPLACE KEEPERS.

CONNECT CLEAR CONTROL ARM SPRING (1) TO UPPER KEYBOARD PLATE.

REHOOK PIN CARRIAGE RESTORE SPRING (7) (FIGURE 2).

REHOOK TWO CAM GEAR LINER SPRINGS (5) (PLATE 25)TO UPPER KEYBOARD PLATE.

CONNECT REAR PIN CARRIAGE SHAFT ARM (2) (FIGURE 10) TO STUD "B" ON PIN CARRIAGE ACTUATING BAIL (1).

CONNECT TOTAL BELLCRANK AND CONNECTING LINK (3) (FIGURE 9) ON STUDS IN FRONT TOTAL KEY BELLCRANK (6) AND REPEAT LATCH TOTAL RELEASE ARM (7).

CONNECT SPRING CLIP (5) TO PIVOT STUD FOR REPEAT LATCH (4).

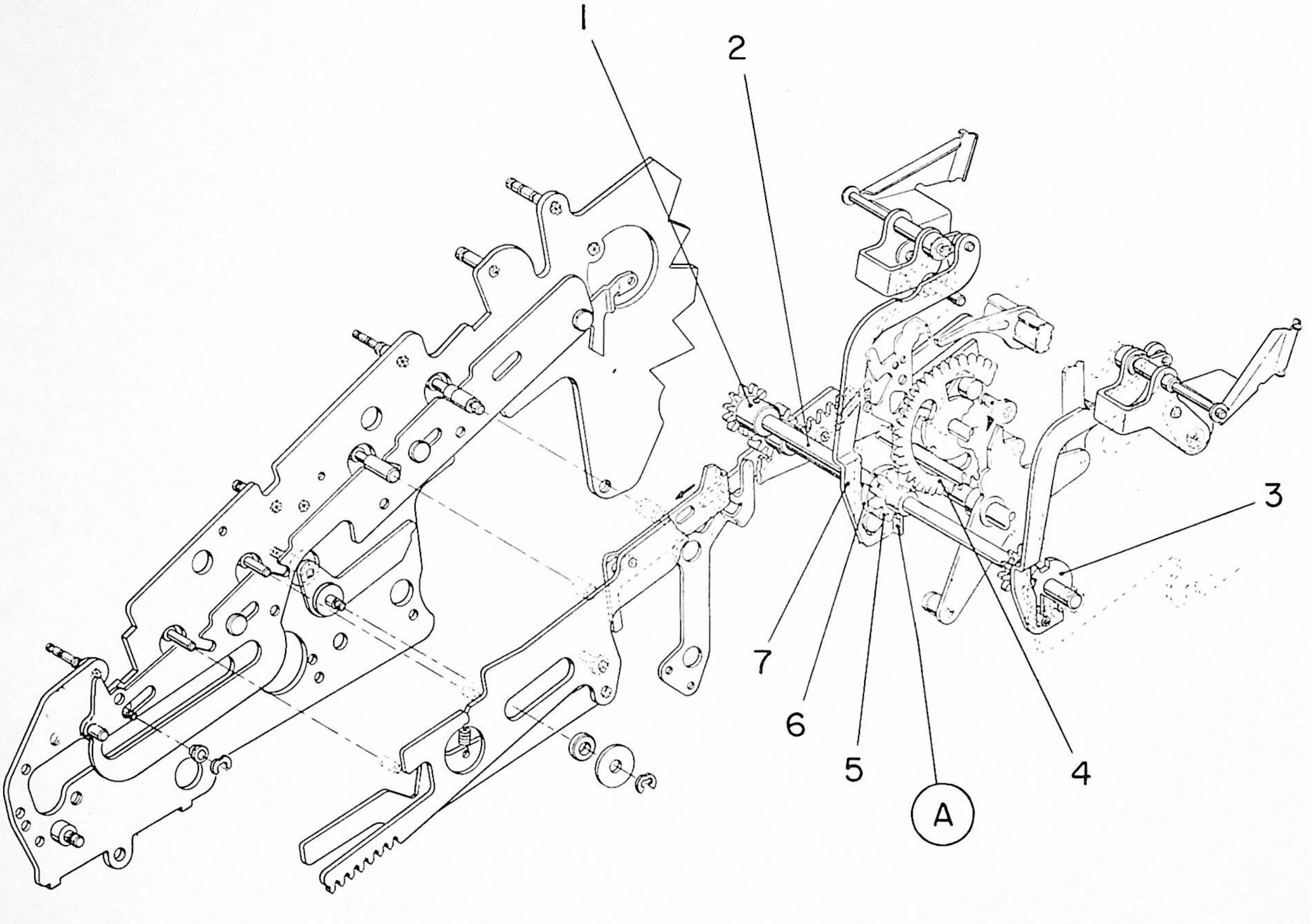
REPLACE UPPER COVER GROMMET BRACKET (40) (PLATE 25)WITH TWO SCREWS.

REPLACING CARRIAGE PIN AND PIN SPRING

PIN CARRIAGE PINS "C" (PLATE 25)HAVE RECENTLY BEEN REDESIGNED TO IMPROVE DETENTING OF PINS "C" ON DEPRESSION OF AMOUNT KEYS TO PREVENT PINS FROM PARTIALLY JARRING UP CAUSING RACK EXTENSIONS TO PASS UNDER PINS, ALLOWING RACKS TO TRAVEL TO NINES POSITION.

REMOVING AND REPLACING OF CARRIAGE PINS "C" IS ACCOMPLISHED BY REMOVING AMOUNT KEY BAIL GUIDE COMB (3) AND SPREADING AMOUNT KEYS BAILS (32). CAUTION: WHEN INSTALLING CARRIAGE PINS "C", CARE SHOULD BE EXERCISED NOT TO MUTILATE PIN SPRINGS (10)(FIG. 2).

TO REMOVE AND REPLACE PIN SPRINGS (10) (FIGURE 2) IT IS NECESSARY TO REMOVE PIN CARRIAGE (3) FROM WITHIN KEYBOARD. AFTER PIN CARRIAGE (3) IS REMOVED, REMOVE ROW OF CARRIAGE PINS (12) IN THE COLUMN THAT PIN SPRING (10) IS TO BE REPLACED. THEN REMOVE MOUNTING SCREW FROM LEFT END OF PIN CARRIAGE FRONT PLATE (11) AND REMOVE FRONT PLATE. CAREFULLY WITHDRAW PIN SPRING (10) THROUGH OPENING IN PIN CARRIAGE. IN REASSEMBLING, REPLACE PIN SPRING (10) AND THEN CARRIAGE PINS (12) AND FINALLY FRONT PLATE (11).


A

TIMING PROCEDURE FOR SYMBOL CONTROL SHAFT

IN EVENT SYMBOL CONTROL SHAFT (2) (PLATE 29) IS REPLACED DUE TO WEAR OR BREAKAGE AND/OR IF PRINTER IS COMPLETELY DISMANTLED, IT WILL BE NECESSARY TO ORIENT COLOR SELECTOR DISCS (3) AND (6) WITH SYMBOL CAM GEAR AND CLEAR CONTROL CAM GEAR (4) TO OBTAIN PROPER FUNCTION OF RIBBON AND PRINTER BLOCKING MECHANISM.

INSTALLATION OF SYMBOL CONTROL SHAFT (2) IS AS FOLLOWS:

1. REMOVE PRINTER FROM MACHINE
2. REMOVE PINS IN RIGHT AND LEFT COLOR SELECTOR DISCS (3) AND (6) AND REMOVE SYMBOL CONTROL SHAFT (2)
3. DISENGAGE CAM GEAR LINER AND TIME ALL CAM GEARS IN HOME POSITION WITH EXCEPTION OF CORRECTION CAM GEAR (4) WHICH IS TIMED ONE TOOTH OUT OF HOME POSITION
4. RE-ENGAGE CAM GEAR LINER WITH CAM GEARS TO HOLD THEM IN TIMED POSITION

   NOTE: THE FOLLOWING STEPS SHOULD BE COMPLETED WITHOUT MOVING CAM GEARS
5. PLACE LEFT COLOR SELECTOR DISC (6) OFF THE SYMBOL CONTROL SHAFT (2) IN ITS PROPER POSITION IN MESH WITH CORRECTION CAM GEAR (4)

   NOTE: THERE ARE THREE NOTCHES IN COLOR SELECTOR DISCS (3) AND (6). TWO OF THESE NOTCHES ARE GROUPED TOGETHER AND THE THIRD IS ALONE. LOOKING AT THE FRONT OF THE PRINTER, THE POSITION OF LEFT COLOR SELECTOR DISC (6) IN RELATION TO LEFT RIBBON CONTROL LINK (7) SHOULD BE AS FOLLOWS:

   THE THREE NOTCHES IN DISC (6) SHOULD BE TO LEFT SIDE OF GEAR (5) AN FACING OUT OR TO FRONT OF PRINTER. SINGLE NOTCH SHOULD BE TO THE BOTTOM OF PRINTER BUT ROTATED FAR ENOUGH TO FRONT SO TAB "A" ON LEFT RIBBON CONTROL LINK (7) COMES IN CONTACT WITH DISC (6) ONE TOOTH OR SPACE IN BACK OF NOTCH
6. AFTER PLACING LEFT COLOR SELECTOR DISC (6) IN ITS PROPER POSITION, START SLIPPING SYMBOL CONTROL SHAFT (2) INTO POSITION. PLACE RIGHT COLOR SELECTOR DISC (3) IN POSITION AND FINISH SLIPPING SYMBOL CONTROL SHAFT (2) INTO POSITION
7. PIN LEFT COLOR SELECTOR DISC (6) IN PLACE, BEING SURE TO LINE UP PEEN MARKS ON DISC (6) AND HUB OF SYMBOL CONTROL GEAR (1)
8. ROTATE RIGHT COLOR SELECTOR DISC (3) WITHOUT ROTATING SYMBOL CAM GEAR TO LINE UP PEEN MARK ON DISC (3) WITH PEEN MARKS ON LEFT DISC (6) AND SYMBOL CONTROL GEAR (1) SO IT CAN BE PINNED IN ITS PROPER POSITION

TEN KEY MODEL

INSPECTIONS AND ADJUSTMENTS

1. PIN CARRIAGE (22) (FIGURE 11) SHOULD MOVE FREELY, LEFT TO RIGHT, ON REAR PIN CARRIAGE SUPPORT SHAFT (17) AND FRONT PIN CARRIAGE SUPPORT SHAFT (25) WITH PIN CARRIAGE (22) FORWARD AND SHIFTED TO REAR. ALSO, DECIMAL INDICATOR COVER (2) SHOULD CLEAR DECIMAL INDICATOR PLATE (1) WHEN PIN CARRIAGE (22) IS SHIFTED TO REAR.

   ADJ. FORM EARS "A" ON PIN CARRIAGE (22) TO MAINTAIN MINIMUM PLAY WITH FRONT PIN CARRIAGE SHAFT (25). FORM DECIMAL INDICATOR COVER (2) TO CLEAR DECIMAL INDICATOR PLATE (1) WHEN PIN CARRIAGE (22) IS SHIFTED TO REAR.

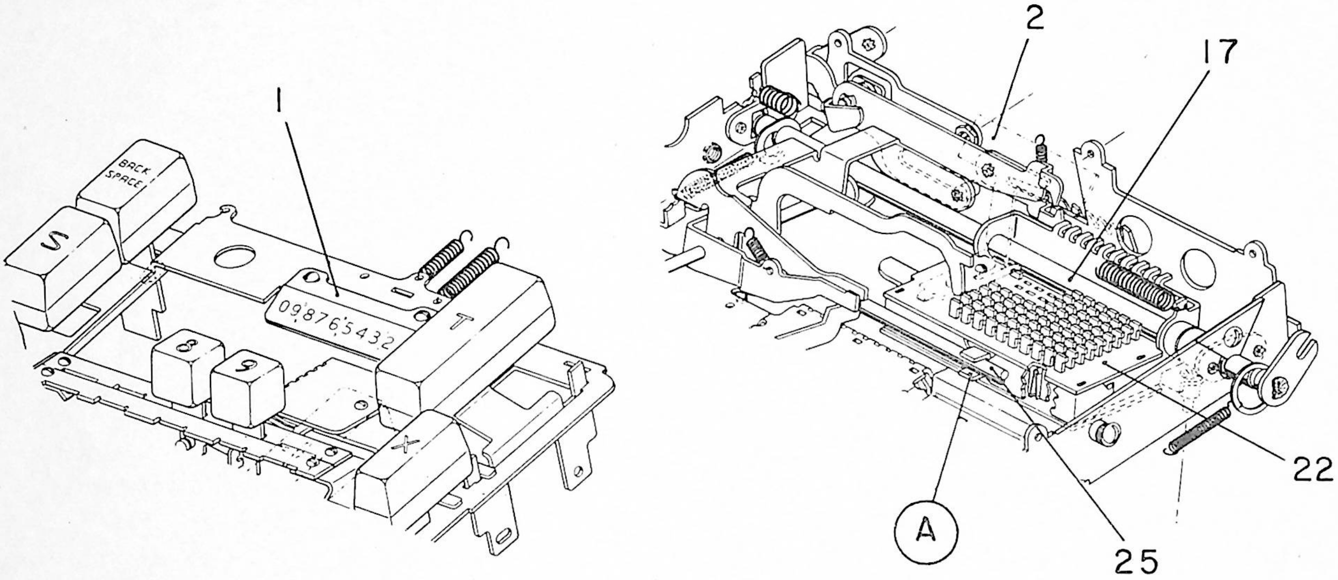


FIG. 11

2. EAR "F" (FIGURE 12) ON ESCAPEMENT BAIL (31) SHOULD TOUCH UNDERSIDE OF ESCAPEMENT CONNECTING ARM (37) IN NORMAL POSITION WITHOUT HOLDING EITHER PART OUT OF NORMAL.

   ADJ. FORM EAR "F" UP OR DOWN.

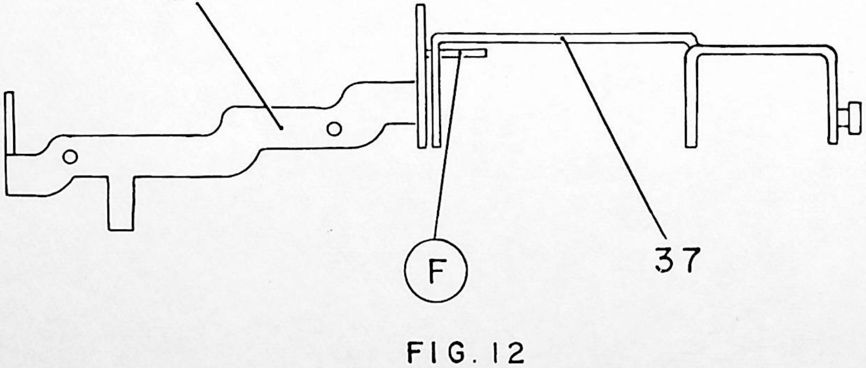


FIG. 12

omit #3

3. ESCAPEMENT LEAD SHOULD OCCUR WHEN CARRIAGE PINS "C" (FIGURE 13) STILL HAVE .015" FURTHER TRAVEL. PIN SPRING "A" SHOULD HAVE SUFFICIENT TENSION TO DETENT AND BOTTOM PIN "C" FROM THIS POINT.

ADJ. TORQUE REAR PORTION OF ESCAPEMENT CONNECTING ARM (37) TO CHANGE ESCAPEMENT LEAD. REPLACE PIN SPRING "A" TO INSURE PROPER DETENTING OF CARRIAGE PIN.

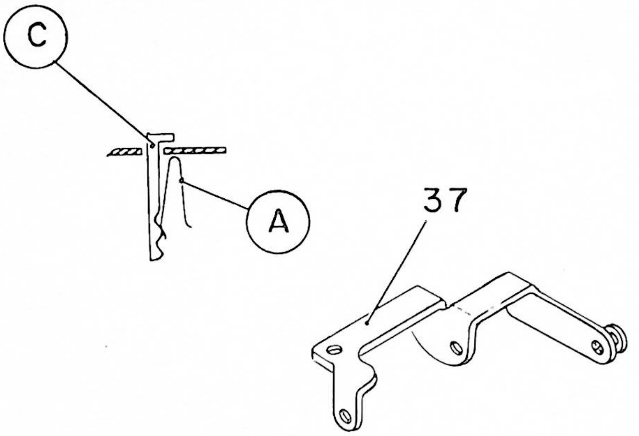


FIG. 13

4. PIN CARRIAGE SHOULD NOT COMPLETE ITS ESCAPEMENT ON SLOW RELEASE OF ANY AMOUNT KEY UNTIL AMOUNT KEY BAIL (32) (FIGURE 14) CLEARS PIN "C" IN NEXT COLUMN.

ADJ. FORM ESCAPEMENT ARM AND DETENT (12) TO LOWER FIXED DOG (14) TO DELAY ESCAPING OF PIN CARRIAGE.

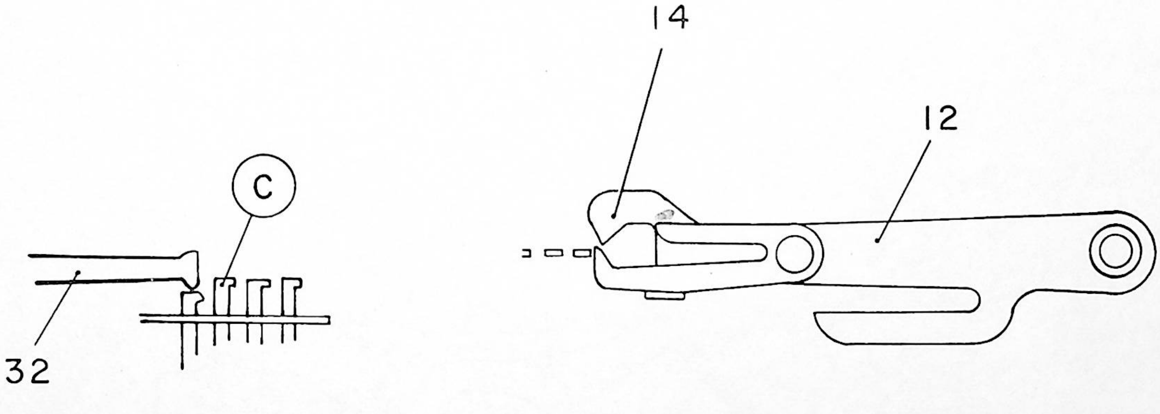


FIG. 14

5. AMOUNT KEY BAILS (32) (FIGURE 15) SHOULD BE POSITIONED SO EACH BAIL (32) HAS EVEN HOLD ON FRONT AND REAR SIDES OF PINS "C" WITH PIN CARRIAGE (22) FORWARD OR REARWARD.

ADJ. MOVE AMOUNT KEY BAIL COMB (3) FORWARD OR REARWARD.

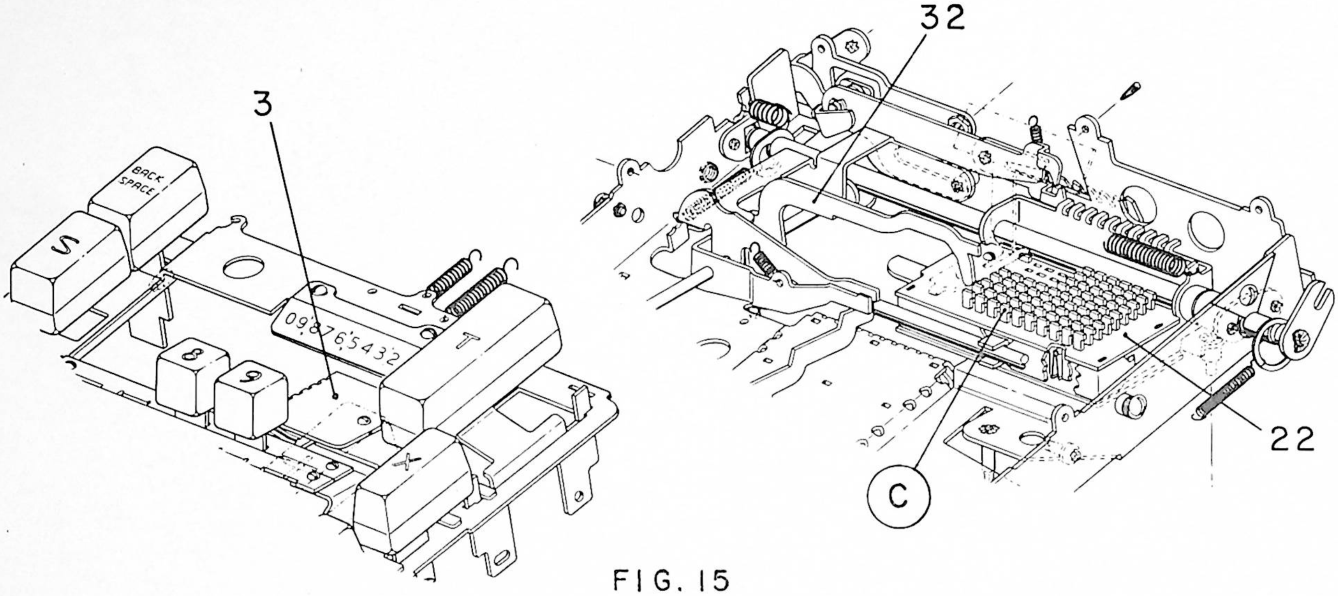


FIG. 15

6. EAR "C" (FIGURE 16) ON BACKSPACE LEVER (2) SHOULD THROW PIN CARRIAGE ONE ESCAPEMENT TOOTH AND FULLY RESTORE CARRIAGE PIN. EAR "C" SHOULD CLEAR BACKSPACE RACK (5) WHEN IN NORMAL POSITION.

ADJ. FORM EAR "C" FOR BACKSPACE THROW AND FORM LEFT END OF BACKSPACE LEVER (2) FOR NORMAL POSITION.

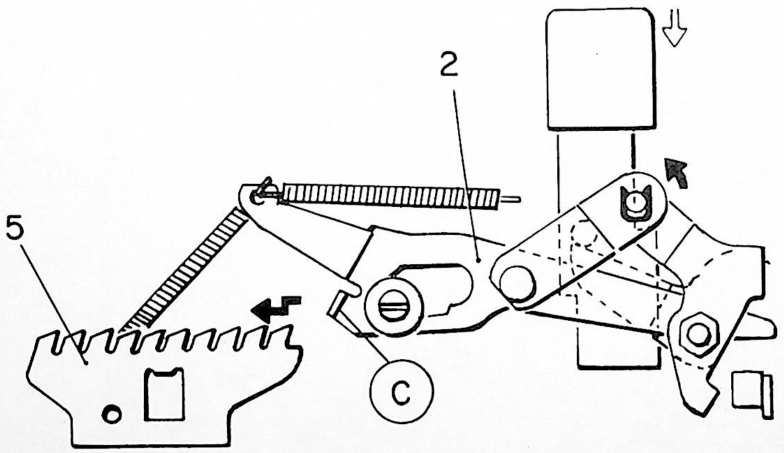


FIG. 16

7. MACHINE NORMAL, CHECK FLATS ON PIN CARRIAGE SUPPORT SHAFT (17) (FIGURE 17) FOR BEING ON FLATS OF KEYBOARD FRAME.

ADJ. FORM EXTENSION "A" OF PIN CARRIAGE ACTUATING BAIL (1).

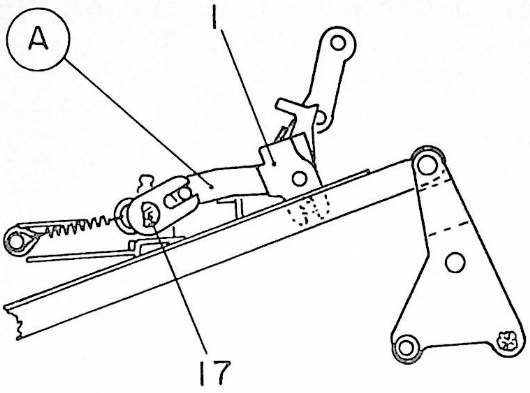


FIG. 17

8. MACHINE NORMAL, MANUALLY ROTATE OUTER RACK STOP ACTUATING BAIL (5) TO RAISE RACK EXTENSIONS (3) IN PATH OF FIXED ZERO STOP ON PIN CARRIAGE. AT THIS TIME, CHECK FOR .040" CLEARANCE BETWEEN RACK EXTENSIONS (3) AND FIXED ZERO STOP. ALSO, CHECK FOR .040" CLEARANCE BETWEEN ZERO STOP PINS AND RACK EXTENSIONS (3). TO DO THIS, ENTER A SIGNIFICANT FIGURE, HOLD REPEAT KEY DEPRESSED AND RAPIDLY DEPRESS ZERO KEY TO STEP OVER PIN CARRIAGE. RACK EXTENSIONS SHOULD NOT CONTACT AND RESTORE ZERO PINS, ALLOWING RACKS TO TRAVEL TO NINES POSITION. MAKE THIS CHECK SEVERAL TIMES.

ADJ. LOOSEN KEYBOARD MOUNTING SCREWS AND KEYBOARD ECCENTRIC LOCKING SCREWS (4) AND, WITH KEYBOARD ECCENTRICS "A", POSITION KEYBOARD FRONT OR REAR TO OBTAIN .040" CLEARANCE BETWEEN CLOSEST RACK EXTENSION (3) AND FIXED ZERO STOP.

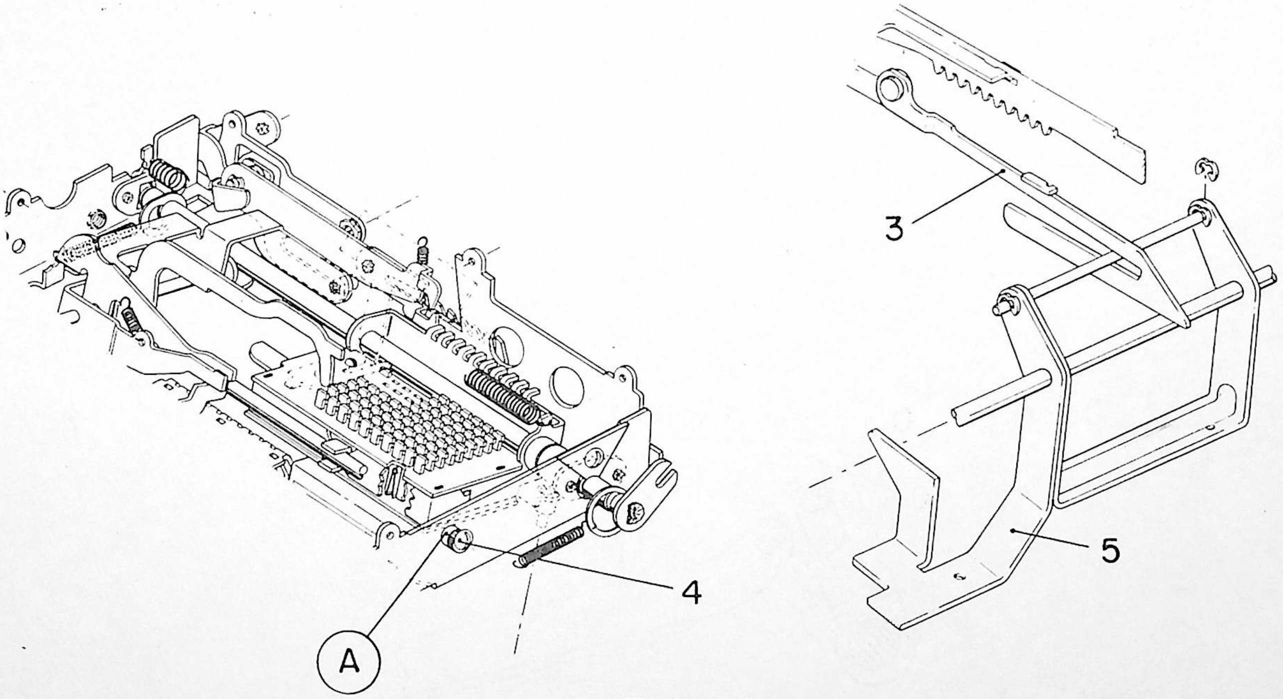


FIG. 18

9. MACHINE NORMAL, STUD "B" (FIGURE 19) IN OUTER RACK STOP ACTUATING BAIL (5) SHOULD BE CENTERED WITH VERTICAL SLOT IN RACK STOP BAIL ACTUATING LINK (7). AT THIS TIME, RETRACTABLE RACK STOP SHAFT (4) SHOULD REST ON TOP OF RACKS (1).

ADJ. TORQUE OUTER RACK STOP ACTUATING BAIL (5) TO CENTRALIZE STUD "B" IN VERTICAL SLOT OF RACK STOP BAIL ACTUATING LINK (7).

4

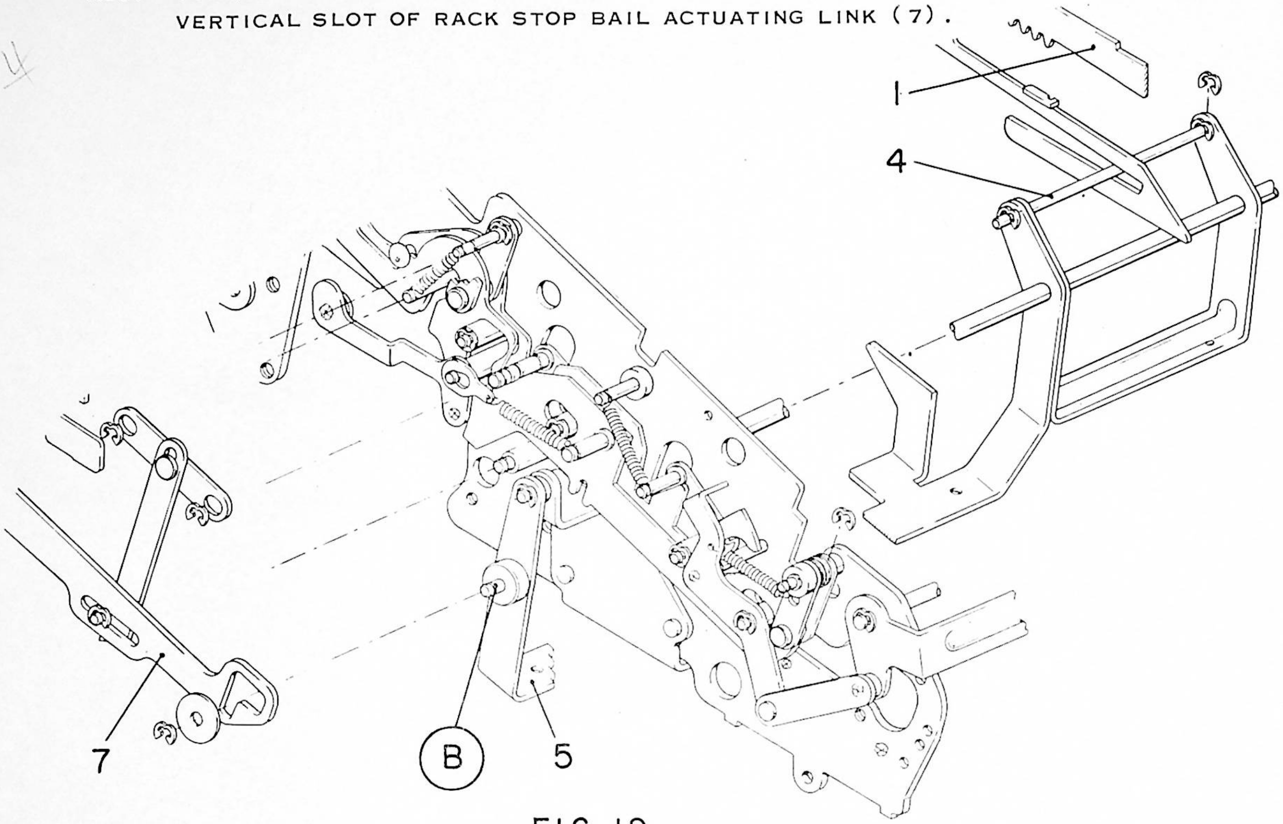


FIG. 19

10. EAR "D" ON TOTAL RELEASE ARM (7) (FIGURE 20) SHOULD RELEASE REPEAT LATCH (6) FROM STUD "C" WHEN TOTAL KEY IS DEPRESSED.

ADJ. FORM EAR "D" ON TOTAL RELEASE ARM (7).

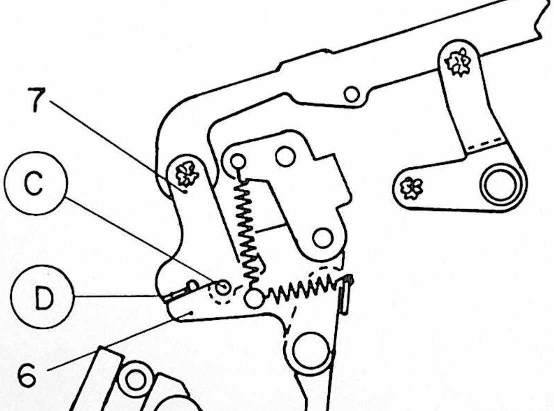


FIG. 20

11. EAR "A" (FIGURE 21) ON PIN CARRIAGE RETURN LINK (6) SHOULD CLEAR REAR EDGE OF GUIDE SHELF (3) BY .030" IN NORMAL POSITION AND, WITH MACHINE HAND-CRANKED UNTIL PIN CARRIAGE RETURN CAM FOLLOWER (4) IS AT LOW POINT OF CAM (5), PIN CARRIAGE SHOULD BE LIMITING IN OVERTHROW POSITION.

ADJ. LOOSEN LOCKING SCREW "B" AND TURN PIN CARRIAGE RETURN LINK ECCENTRIC "C".

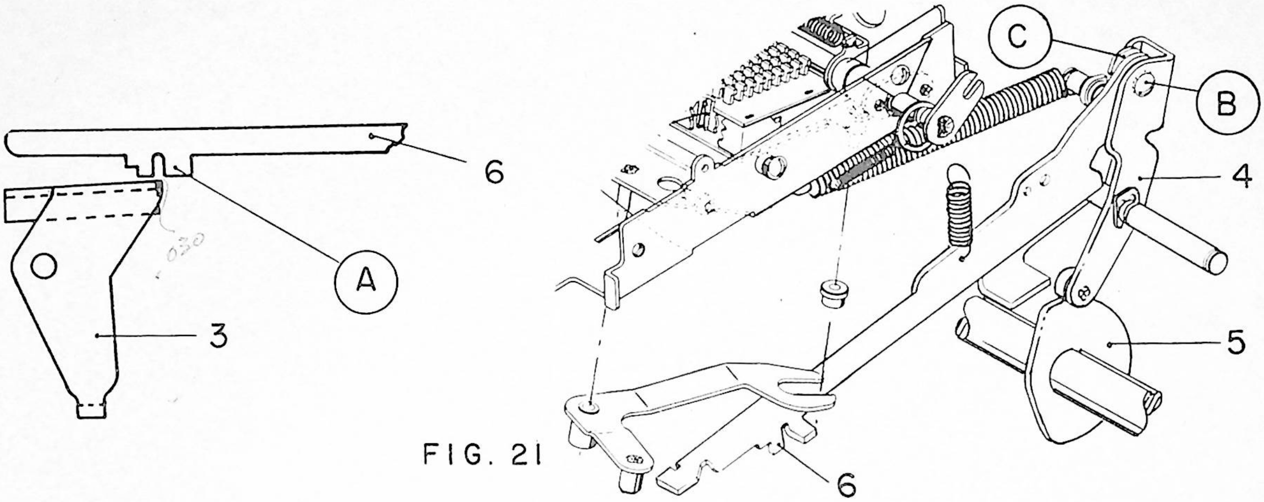


FIG. 21

12. ADD KEY (1) (FIGURE 22) AND MINUS KEY (9) SHOULD HAVE SLIGHT ADDITIONAL MOVEMENT AFTER OPENING CLUTCH.

ADJ. TORQUE ADD CONTROL BAIL (11) OR MINUS KEY CONTROL BAIL (10).

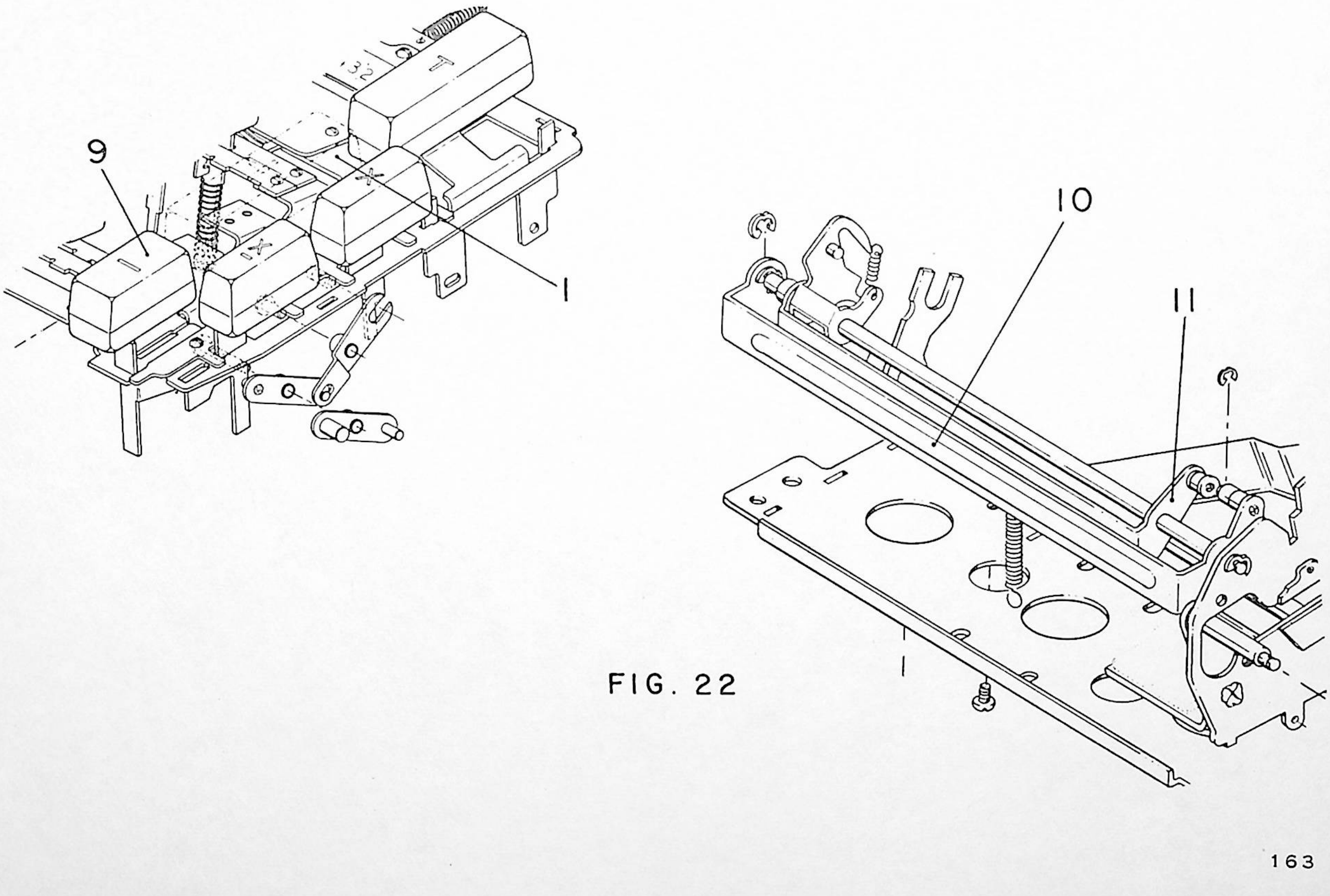


FIG. 22

13. STUD "E" (FIGURE 23) ON PLATEN INDEXING CAM FOLLOWER BLOCK (6) SHOULD BE POSITIONED IN FRONT OF EXTENSION "G" ON PLATEN INDEXING CAM FOLLOWER (7) AND STOP CAM FOLLOWER BEFORE PLATEN SPACING LINK (13) ENGAGES TOOTH ON PLATEN ON CLEAR KEY OPERATION AND STUD "E" ON PLATEN INDEXING CAM FOLLOWER BLOCK (6) SHOULD CLEAR EXTENSION "G" ON PLATEN INDEXING CAM FOLLOWER (7) ON ALL OTHER OPERATIONS.

ADJ. FORM PLATEN INDEXING CAM FOLLOWER BLOCK (6) TO TIP STUD "E". TO DO THIS, IT WILL BE NECESSARY TO REMOVE PRINTER FROM MACHINE.

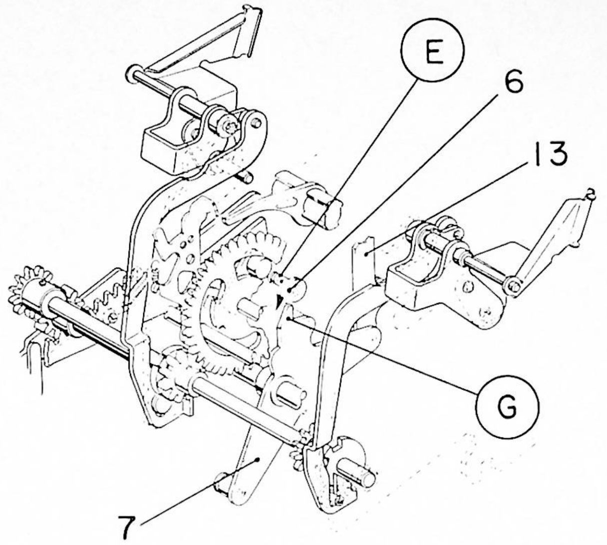


FIG. 23

14. DECIMAL INDICATOR PLATE (1) (FIGURE 24) SHOULD SHOW DECIMAL WHEN PIN CARRIAGE IS TWO SPACES OUT OF NORMAL BUT SHOULD HIDE COMMA WHEN THREE MORE SPACES ARE INDEXED. CHECK INDICATOR COVER FOR BEING SQUARE WITH DECIMAL INDICATOR PLATE (1).

ADJ. LOOSEN TWO SCREWS (2) AND MOVE DECIMAL INDICATOR (1) LEFT OR RIGHT. FORM INDICATOR COVER FOR SQUARENESS.

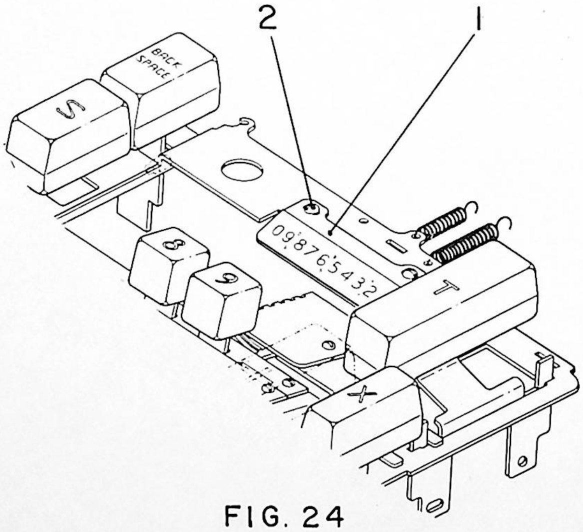


FIG. 24